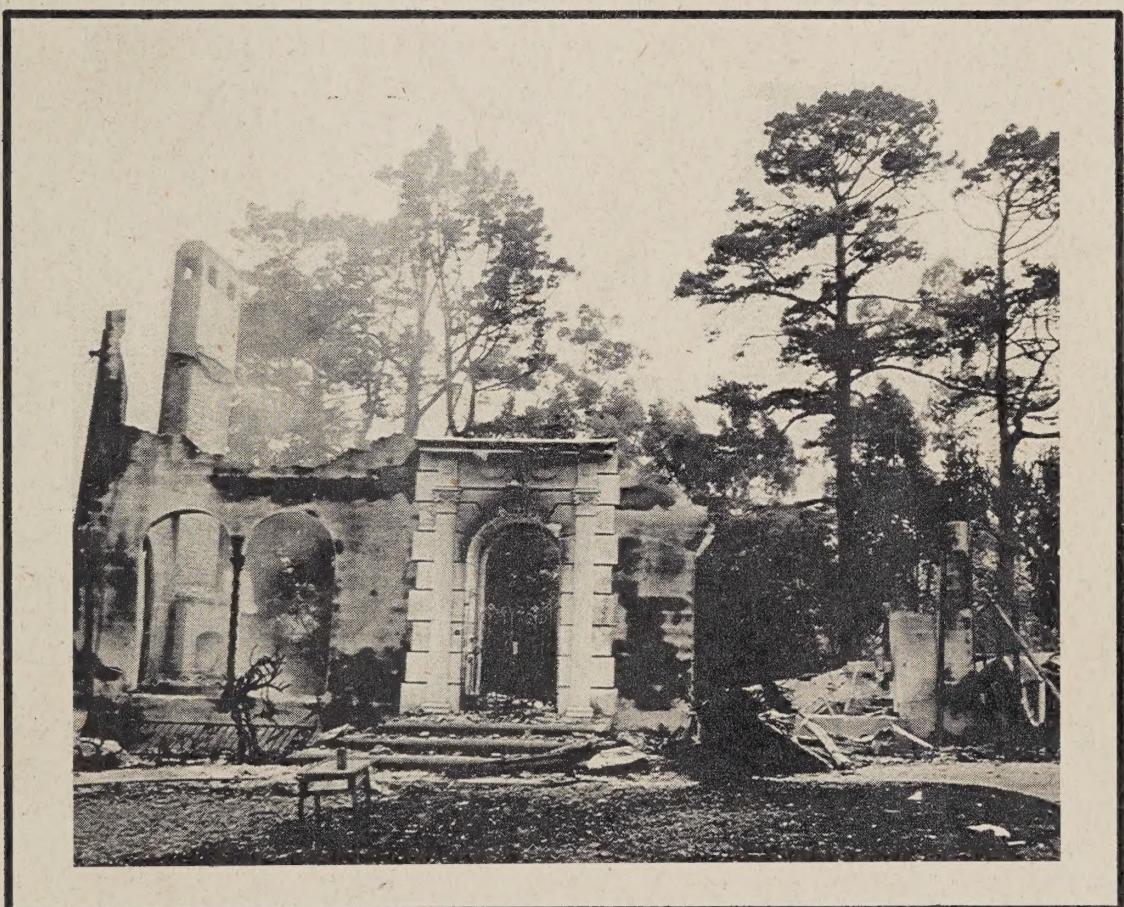


HAZARD MITIGATION REPORT

for the East Bay Fire in the Oakland-Berkeley Hills



In Response to the October 22, 1991
Federal Disaster Declaration
Covering Alameda County, California
FEMA-919-DR-CA

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California Office of Emergency Services

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Federal Recycling Program

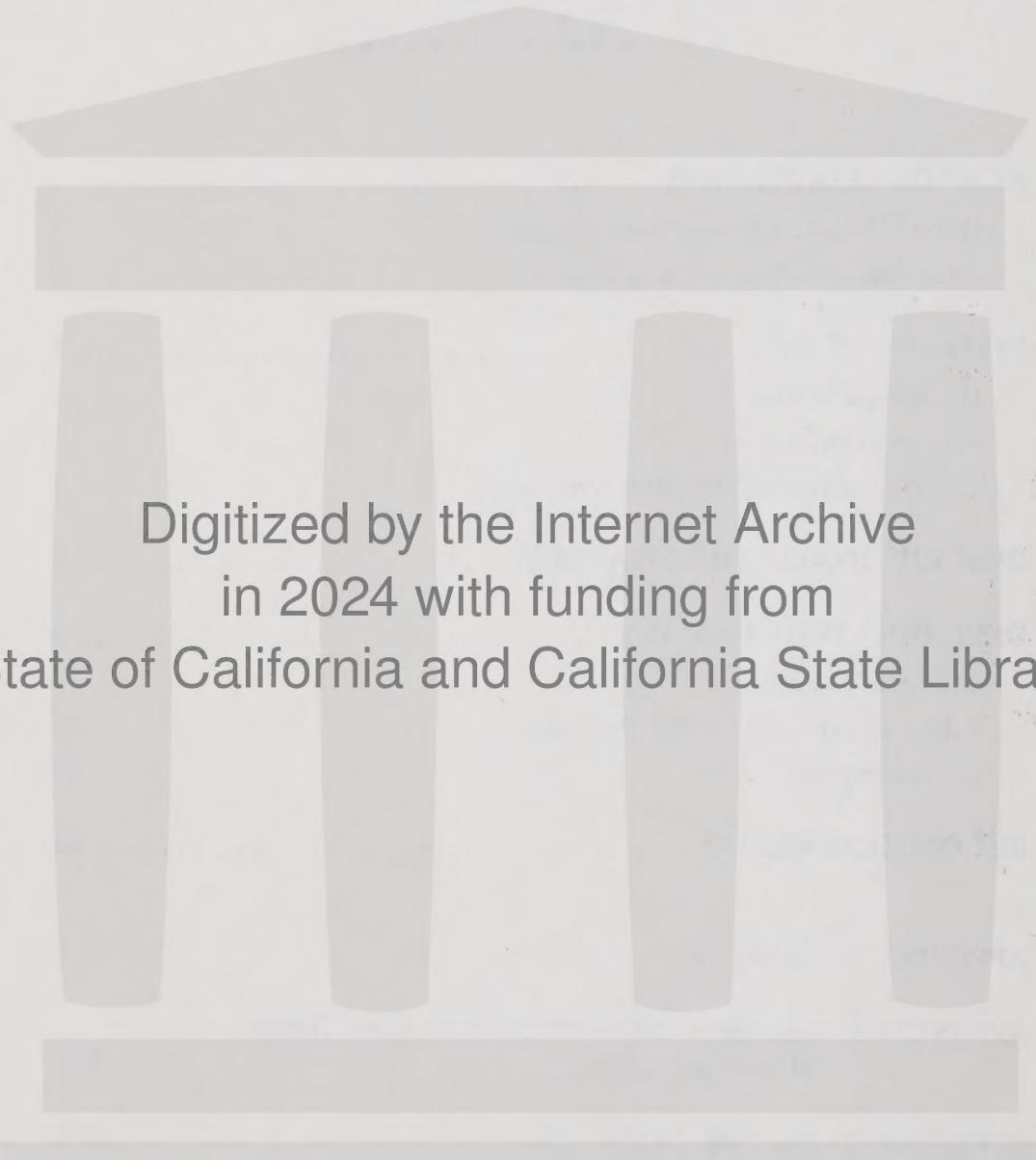


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ACKNOWLEDGEMENTS

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INTRODUCTION

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DISASTER DECLARATION

On October 22, 1991, the President declared the County of Alameda in the State of California to be a major disaster area as a result of damages from urban-wildland fires (FEMA-919-DR-CA). The declaration was for Individual and Public Assistance.

PURPOSE OF THIS REPORT

This report offers hazard mitigation recommendations and guidance for federal, state and local officials to reduce fire damages in urban-wildland areas (those areas where development has penetrated the wildlands) as it exists not only in Alameda County, but throughout the State of California. The report's recommendations are based on an assessment of damages and their causes, sustained during the incident period of October 20 to 29, 1991 and a comparative review of issues identified in the *Fire Hazard Mitigation Plan for the State of California* prepared for the June 1990 Southern California Fires (FEMA-872-DR-CA).

The primary objectives of this report are to:

1. Identify fire hazard mitigation actions to be applied to the immediate and long-term recovery, repair, and reconstruction activities within the affected area;
2. Evaluate existing and proposed legislation for effective implementation of fire hazard mitigation programs in California's urban-wildland areas;
3. Analyze fire hazards in the declared county to be used as the basis for identifying comparable "at risk" areas of the State;
4. Assess affected local government's fire mitigation capabilities; and,
5. Identify fire hazard mitigation measures to be implemented not only in the declared county, but for other similarly hazardous areas throughout the State.

The body of this report transmits the Hazard Mitigation Survey Team's concerns and recommendations to the Federal Emergency Management Agency (FEMA) Regional Director, the Governor's Authorized Representative (GAR), local government, and other state and federal agencies having interests in the burn area.

INTRODUCTION

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OVERVIEW OF HAZARD MITIGATION AUTHORITIES

When the State proclaims a State of Emergency it confers upon the Governor certain emergency powers as specified in the California Emergency Services Act which provide for the assignment and coordination of functions to be performed by state agencies, including hazard mitigation. If the severity of an emergency is such that it exceeds the response capacity of the State, the Governor can request the President to issue a major disaster declaration, where upon various sections of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended) take effect providing the framework for the implementation of federal hazard mitigation programs.

As a condition of receiving federal disaster assistance, Section 409 of the Act requires that, at a minimum, disaster recovery activities, including repairs, restoration, or replacement, be accomplished in accordance with applicable codes, specifications and standards. Additional mitigation may be required as a further condition for receiving disaster assistance, if deemed appropriate after consultation with locally elected officials. Section 409 also requires the State to review and update its existing Fire Hazard Mitigation Plan to reflect the current disaster, the lessons learned, and the actions that must be taken to reduce the potential of future urban-wildland conflagrations.

Under Section 409, FEMA encourages state and local governments to adopt and implement the goals and objectives outlined in the State Fire Hazard Mitigation Plan. The intent of Section 409 is to establish and promote a dynamic process which uses the disaster declaration to review and update existing hazard mitigation programs rather than treating each disaster as an isolated event.

To implement the Section 409 requirements for this disaster, Federal, State, and Local Hazard Mitigation Officers have been appointed. These Hazard Mitigation Officers assist the Hazard Mitigation Survey Team to accomplish the following actions:

1. Identify the areas of significant fire hazards;
2. Evaluate the burn areas;
3. Review existing local land use regulations, building codes, existing fire hazard mitigation legislation and programs;
4. Review and evaluate existing warning and evacuation plans;
5. Recommend measures or actions to mitigate the impact of future urban-wildland fires; and,
6. Coordinate the necessary actions to implement these proposed recommendations.

Based upon the information gathered through the above actions, the Federal and State Hazard Mitigation Survey Team prepares a Hazard Mitigation Report (this report) which identifies significant issues to be addressed if the loss of life and the damage to property from future urban-wildland fires in Alameda County and throughout the State of California is to be reduced. To fulfill the Section 409 requirements for this disaster declaration, the State will incorporate recommendations from this report into the State

INTRODUCTION

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Fire Hazard Mitigation Plan, update and submit it to FEMA's Regional Director within 180 days of the disaster declaration, or by April 22, 1992.

The final element of the Section 409 process, and the most important, is to coordinate and monitor implementation of the State Fire Hazard Mitigation Plan. Both the Federal and State Hazard Mitigation Officers will promote implementation of the plan at the local level.

This report was prepared by federal and state hazard mitigation staff with extensive collaboration and review within the Governor's Office of Emergency Services and the California Department of Forestry and Fire Protection (CDF).

DESCRIPTION OF THE DISASTER

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The moisture laden air that normally sweeps eastward from the Pacific Ocean was replaced the week before the fire by winds flowing westward from the Central Valley of California as a large, stationary high-pressure area settled over the Great Basin east of the Sierra Nevada Mountains.

At the same time, a center of low pressure area stalled offshore. The result was a foehn wind that, at speeds in excess of sixty-five-miles per hour, raced down from the crest of the Oakland-Berkeley Hills. Coupled with record high temperatures well into the nineties, the hot, dry winds gusted and swirled through five-years of drought-dry brush and groves of freeze damaged Monterey Pine and Eucalyptus groves. All of the conditions for a major fire disaster were present that morning of October 20, 1991.

The resultant 1600 acre East Bay Fire (formally titled as the Tunnel Fire) began under suspicious circumstances. Sunday morning, October 20th, at approximately 10:53 a.m. near the Caldecott Tunnel and the site of a brush fire brought under containment the previous afternoon (Saturday), embers from an undetermined source were blown into bone-dry brush and onto nearby residential shake roofs by swirling winds of twenty to twenty-five miles per hour. The fire was out of control in a few minutes, jumping an eight lane "firebreak" (Highway 24). In a matter of hours, this major conflagration would leave twenty-five people dead, 150 injured, destroy 3,354 single family dwellings, and 456 apartments, and cause damages in excess of one billion dollars, the most costly urban-wildland fire in the Nation's history. The conflagration was not officially declared "under control" until 8:00 a.m. Wednesday, October 23, 1991. (See Figure 1 on page 6)

The Alameda County neighborhoods of Claremont, Rockridge, Grizzly Peak, Broadway Terrace, Montclair, and the City of Piedmont were evacuated during the fire. Adjacent streets and freeways were clogged with residents trying to get out, while sightseers, emergency personnel and fire fighters were trying to get in.

The 2,000 degree fire affected utility systems including power, gas, telephone, and water. Loss of power early in the fire, caused by burning powerlines and melting underground services, also affected water system pumping plants. A total of eight pumping plants lost power Sunday afternoon. Portable pumps and emergency generators were installed by Sunday evening as soon as the conflagration and the Oakland Fire Department permitted access. Ten water system reservoirs were drained at the peak of the fire as a result of an unprecedented demand from fire fighting units, fire prevention measures by homeowners, and broken water service connections.

The fire split into three fingers, north toward the Claremont Hotel, south toward Broadway Terrace, and east toward Orinda. All three fingers of the fire remained out of control through the night and into

DESCRIPTION OF THE DISASTER

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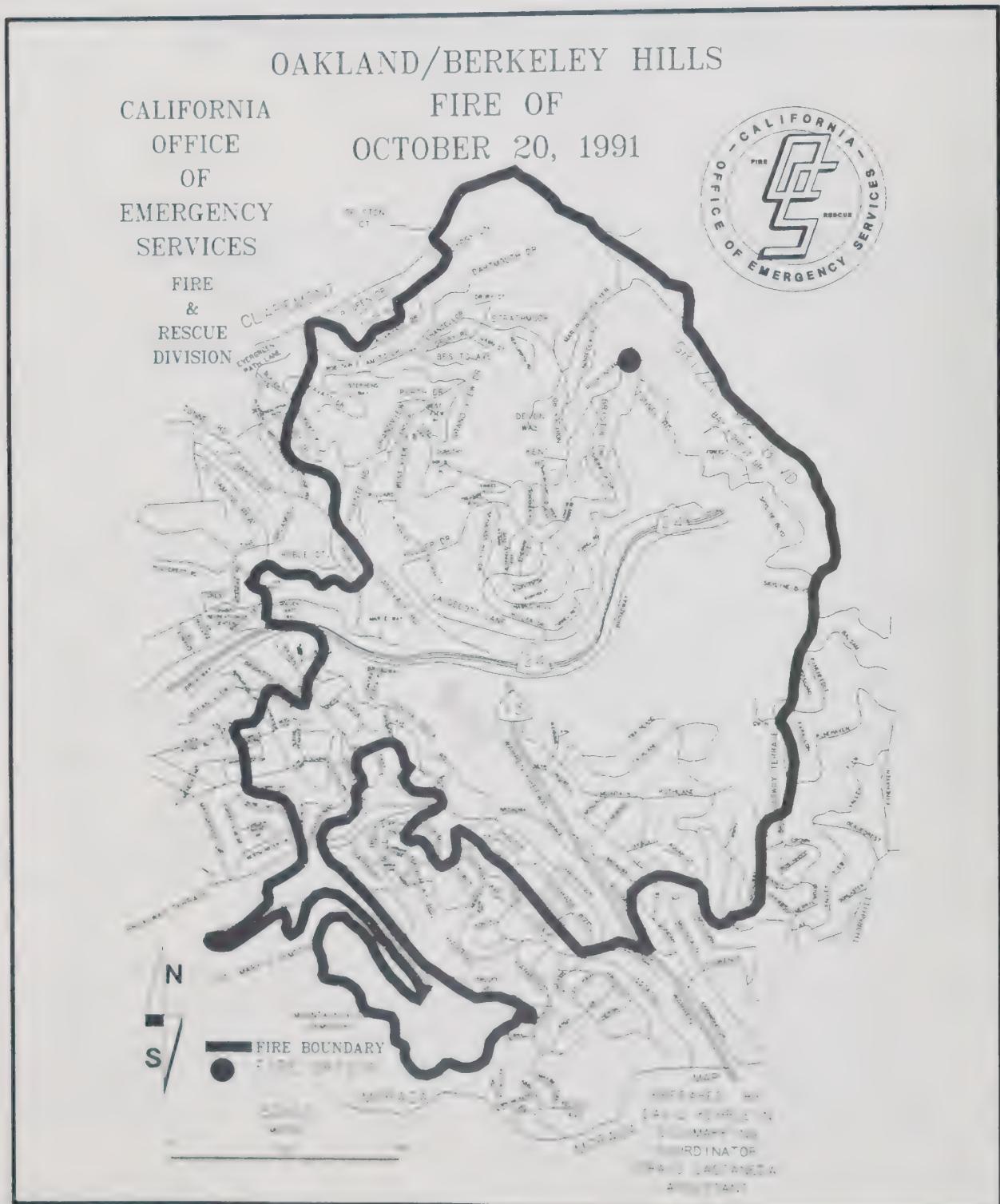


Figure 1.

DESCRIPTION OF THE DISASTER

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the morning of October 21st. By 8:50 a.m. that morning, the eastern finger of the fire was ten percent contained, while the remaining two fingers burned out of control.

Twenty helicopters and ten air tankers had been called into action since first light, Monday, October 21st, as 300 law enforcement officers helped to control the flow of personnel and equipment throughout the fire area. Over 370 fire units and 1,000 fire personnel were on line by 1:30 p.m. Monday afternoon.

Later that same day, cooler temperatures settled in as the reduced winds shifted to the west. At 5:45 p.m., in the early evening of October 21st, 1991, the conflagration was declared contained with no active fire head burning. As night approached, fog moved in over the burn area, temperatures fell and humidity increased. Several hot spots were extinguished during the night.

The East Bay Fire was officially declared under control at 8:00 a.m., Wednesday, October 23, 1991, some seventy hours after its inception.

DESCRIPTION OF DAMAGES

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INDIVIDUAL IMPACTS

Over 10,000 people were evacuated from the Oakland-Berkeley Hills communities on October 20th-21st. Five American Red Cross (ARC) shelters were established, four in Oakland and one in Berkeley. Approximately 1,300 individuals registered at the shelters, with 450 staying the first night. The last congregate care shelter closed on October 25th. During the emergency, the Red Cross, Salvation Army, Seventh Day Adventists, and St. Vincent De Paul Society served in excess of 100,000 meals. Refreshments continued to be served at the Disaster Application and ARC Service Centers. By November 11th, the Red Cross had answered over 3,000 welfare inquiries from concerned family members.

As of November 15th, the American Red Cross had registered over 1,800 households for assistance at their service centers. Relief costs have exceed \$2.4 million, with final costs estimated to top \$3 million. The Red Cross and United Way fund campaigns were supported by \$3 million in public donations and over 2,000 volunteers assisted at the relief centers.

Of the 11,055 people living in the fire area, 25 were killed, 150 injured, and at least 5,000 left homeless. The average price of the 3,354 single family dwellings destroyed was \$360,000 for a total cost of \$1,207,440,000. Four hundred fifty-six apartment units were destroyed. In addition, 2,000 automobiles were destroyed.

The City of Oakland opened a Community Assistance Center on Thursday, October 24th, while the fire fighting forces were still in mop-up and defensive operations. The immediate, committed involvement by local, state government agencies and nonprofit service groups (e.g. City Assessor's Office, City Manager's Office, Police Department, City Planning Department, State Department of Motor Vehicles, State Department of Insurance, Housing and Community Development) could be a model for future Disaster Application Centers (DAC).

In addition to the large contingent of city, state, county, and voluntary agencies, the Federal/State Disaster Application Center opened on Saturday, October 26th, in the Oakland Community Assistance Center. As of November 23rd, the Disaster Application Center figures were as follows:

Total Registration	4407
Temporary Housing Grants	1221
Individual Family Grants	842
Small Business Administration	
Loan Applications	3921

DESCRIPTION OF THE DAMAGES

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PUBLIC AGENCIES AND UTILITIES DAMAGES

Pacific Gas and Electric Company (PG&E) reported 7,300 homes without electricity and 8,000 without gas on Tuesday, October, 22nd. PG&E recruited 1,500 workers from divisions across northern California, who worked around the clock to restore service. By Sunday, October 27th, less than 300 homes were still without power. Over 400,000 pounds of debris were hauled away by PG&E, which included 1,500 utility poles and 35 miles of power, telephone, and TV cable lines. PG&E damage estimates are in excess of \$20,000,000.

East Bay Municipal Utilities District (EBMUD) reported few mainbreaks in the fire area. Nevertheless, significant damage was reported to above ground distribution system facilities and customer services. Water distribution system damage has been estimated at several million dollars with damage to hundreds of water system service connections and hydrants. Additionally, landscaping and structures at 20 pumping plants and reservoirs sustained damage.

Based on preliminary damage assessment (PDA) estimates \$54,356,000 was expended on fire suppression and emergency protective measures. An additional \$5,794,000 has been estimated for repair and restoration of publicly owned facilities.

HILLSIDE IMPACTS

The fire burned residential neighborhoods and wooded and grass covered hillsides. Acres of vegetation were totally destroyed, leaving slopes vulnerable to erosion. The slopes in the area are steep, with inclines of as much as 60 degrees.

Fire of this intensity with its associated high temperatures often creates what is termed a "hydrophobic" soil condition, a barrier which inhibits or prevents water from soaking into the soil. Heavy rains of a short duration (two inches in three hours) or lighter rains for an extended period of time (six inches over three days) could saturate the permeable ground, causing soil slippage off steep headland slopes. Uncompacted colluvial fill and slope debris would be flushed into inlets and stream channels. This reduces the effective carrying capacity of these inlets and streams, raising the flood elevation and spreading the flows over a greater area. The result may be overland flooding with potential damage to streets, utilities, and homes in the burn and adjacent areas. Structures that were shown to be outside special flood hazard areas prior to the fire could experience flood damage from winter rains.

Immediately after the fire was controlled, the City of Oakland established priority erosion control zones in the burn area and implemented an erosion control plan. This was accomplished with technical assistance from nine agencies composed of federal, state and local entities. The first priorities were to: 1) protect areas which pose an imminent threat to lives and property; and, 2) protect areas upslope and adjacent to significant drainage courses, water conveyance systems, and water courses that drain to Lake Temescal and San Francisco Bay Estuary. In addition, all erosion control measures are intended to protect the water quality of the Bay and its tributaries. Initial erosion and sediment control efforts indicate that costs could reach \$5,000,000. Additional costs will be incurred for long term monitoring and maintenance.

DESCRIPTION OF THE DAMAGES

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The City of Oakland asked the California Conservation Corps (CCC) to provide labor for the initial erosion control measures. Working under the direction of the City's consultants, the CCC began operations on October 27th. An operations base was set up at the CCC's Bay Area Center in San Pablo. Crews were brought in from 13 CCC districts and the East Bay Conservation Corps. An average of 14 crews consisting of 207 personnel worked through the 24th of November.

The erosion control operation in Berkeley began on October 25th and was completed in early November at a cost of approximately \$310,000. Hundreds of United States Coast Guard volunteers provided labor for initial erosion control operations.

The Soil Conservation Service (SCS) undertook a \$1.8 million dollar emergency watershed protection project which included seeding for four watersheds in the burn area: Temescal, Vicente, Claremont and Parkwood. The seeding was completed by November 3rd. SCS specialists conducted two erosion control workshops for homeowners on November 2nd in Oakland.

A survey conducted by the SCS of the entire burn area identified 30 sites with the potential for significant erosion. Ten of these sites have been funded through SCS Watershed Program Funds. Contracts were let, with the work scheduled to begin November 4th. Most of the work consists of debris removal, placement of culvert extensions, and installation of debris and trash racks. The primary concern in the burn area is potential debris and mud flows. Massive earth movements, such as rotational landslides, are considered unlikely. Further review by USGS and the Department of Conservation, Division of Mines and Geology, is underway. USGS is considering creating a mathematical model for determining the likelihood of landslides given expected climatic conditions and using this information for hazard mitigation cost-effectiveness judgments.

RECOMMENDATIONS

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An estimated 7,000,000 Californians are living in established hillside settlements or in new, rapidly growing communities in urban-wildland areas.¹ These areas are known to be extremely hazardous. The inhabitants of these hazardous areas are at risk of not only losing their homes, but even their lives from wildland fire. It is no longer a question of if a conflagration will occur in these areas, it's a question of where, when, and how great the losses will be.

In the opinion of the Hazard Mitigation Survey Team, many California communities have repeatedly failed to effectively recognize the seriousness and extent of their vulnerability to catastrophic wildland fire. *Fire Safe Guides for Residential Development in California* (Appendix C), formulated by the County Supervisors Association of California (CSAC) and CDF in 1965 (revised in 1980), has been available for twenty-six years to assist and promote the development and adoption of Fire Safe Planning for local jurisdictions. Unfortunately, few local governments have implemented the guidance. Historically, local fire ordinances or general plan safety updates have occurred only after a major wildland fire has caused a significant loss of lives and/or structures.

The direct relationship between development in California's wildland areas and destructive conflagrations has been studied and evaluated numerous times. We know the problems, as well as the solutions, yet the potential for catastrophic fires increases every year. California's communities have a long way to go toward solving the wildland fire problems identified twenty-six years ago when the *Fire Safe Guides for Residential Development* were first developed.

Although progress has been made in public education and regulation, the increasing number of catastrophic wildland fires² confirms that property owners, residents, and local governments must work together to meet this threat. Fire protection is a partnership between property owners, residents and fire protection agencies. Property owners and residents must take additional responsibility for their own safety if they choose to live in wildland or other potential high fire hazard areas.

This fire dramatically demonstrates that where "High Hazard" areas are allowed to exceed minimum standards for fire safety, that "area" threatens not only itself, but the surrounding communities as well. Communities which in and of themselves do not normally have this level of risk are now at risk. Should the higher hazard codes and standards (and costs) be extended to communities adjacent to high hazard areas, or should the same level of protection be afforded the community at large through enforcement of fire safe codes in the high fire hazard zones?

1 Source: "A Survey of California County Land-Use Planning Considerations for Fire Protection in the Wildland/Urban Interface", December 1991, State of California, Department of Forestry and Fire Protection

2 *ibid*

RECOMMENDATIONS

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HAZARD MITIGATION MEASURES: The Hazard Mitigation Survey Team developed two sets of mitigation measures for this report which are differentiated as either "Work Elements" or "Recommendations".

Work Elements: Those activities requiring immediate consideration during the recovery effort (repair and reconstruction).

Recommendations: Those activities which can be addressed during the longer term state and local hazard mitigation planning process are listed in Appendix B.

The recommendations address issues common not only to the East Bay Fire of 1991, but to future urban-wildland conflagrations. The recommendations are placed within the context of existing state and federal hazard mitigation programs, local ordinances, Public Resource Codes, where applicable, and current practices. Each measure is linked to issues discussed throughout this report and is organized as follows:

Work Element #: Description of action to be taken. Each mitigation measure is designed to raise an issue with the intent of solving a problem.

Background: Background information supporting the above recommendation. This information may be specific to the East Bay Hills Fire or generalized to the known potential risks from future fires.

Lead Agency: Federal, state, and/or local agencies responsible for leading and coordinating this hazard mitigation action.

Funding: "Work Elements" contain a description of how this action might be funded. "Recommendations" for which no specific source for funding has been identified, will be resolved during the state and local planning efforts.

Schedule: Timetable for implementation of the "Work Elements". "Recommendations" timetables will be resolved during the state and local planning efforts.

Work Element #1: Vegetation management programs in the Oakland-Berkeley Hills need to address four areas:

1. Lands burned by the Oakland-Berkeley Hills East Bay Fire -- An immediate study should be conducted by local government and regional fire departments, in conjunction with federal, state and local resources such as CDF, the University of California, the U.S. Soil Conservation Service, planning agencies, park departments, and public works agencies, to identify short and long-term plans to reduce fuel loading within existing high hazard areas. Consideration should be given to the isolation of existing groves and concentrations of brush, as well as, replacement of same with other species that will be drought tolerant, pose a low fire hazard, and protect slopes from erosion and failure.

RECOMMENDATIONS

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2. Existing development -- Adopt ordinances requiring compliance with *Uniform Fire Codes Appendix II-A* (Appendix D) or standards similar to Public Resources Code (PRC) 4290 and 4291, and establish specific programs to enforce existing codes.
3. Wildlands -- Vegetation in wildlands should be managed for wildlife habitat and slope protection in addition to fire protection.
4. Areas subject to development/rebuilding -- Rebuilding and other new development in similar hillside areas of the cities should meet State Fire Protection standards (see #2 above) while protecting existing riparian zones.

Background:

Lands Burned by the East Bay Fire: In the devastated area the major goal should be proper revegetation. The many variables involved with fuel modification make precise techniques for general application impractical. Areas at risk from landslides or surface erosion will benefit from bio-technical slope protection input from the California Department of Conservation, Division of Mines and Geology, the U.S. Geological Survey, the University of California, the East Bay Regional Parks District and East Bay Municipal Utility District.

Existing Development: Adoption and enforcement of existing state and/or local clearance laws in existing developments will significantly reduce fire hazards. The standards outlined in PRC 4291 should be included in the uniform fire code for cities. Existing PRC regulations do not apply to incorporated cities; however, local government should adopt these "minimum" standards or higher so that its citizens could be provided with the commensurate level of protection now required on State lands. For example, PRC 4291 requires a thirty-foot (or to the property line) clearance of flammable vegetation or other combustible growth around buildings located in mountainous areas, forest-covered lands, brush-covered lands, or grass-covered lands. It also requires "good housekeeping" regarding tree trimming and clean up of dead or dropped vegetation (such as pine needles).

In State Responsibility Area (SRA) lands, there are a number of options available to fire and law officials and the general public involving enforcement of this PRC 4291. The CDF is responsible for ensuring compliance with fire safe rules on SRA lands.

Also, PRC 4119 states that CDF can enforce any fire safe law. Any peace officer can enforce the law and any citizen, including a fire official, can file a complaint.

Wildlands: Eucalyptus and Monterey Pine have been identified as fire hazards and their spread should be controlled. Nevertheless, groves of these trees provide significant protection from landsliding and soil erosion. Removal of all eucalyptus and Monterey Pine over a short time period would substantially increase landslide hazards in the Oakland-Berkeley Hills. If conversion to other species is attempted, the conversion should be progressive, with small areas cleared and replanted over ten to twenty years. It should be stressed that these targeted species are not the only vegetative threat existing in this area. Acres of coyote brush, scotch and french broom, and the vast inventory of ornamental shrubs which are now thirty to forty years old all constitute a significant fire hazard.

RECOMMENDATIONS

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New development: New development should be required to meet local building ordinances that incorporate State Fire Protection standards (PRC 4290, et al.). In addition, riparian zones should be protected because of the fire retardant nature of the vegetation contained in these zones, in many cases providing a natural fire break or green belt.

Lead Agency: Local agencies and jurisdictions with technical advice from the University of California, California Department of Conservation Division of Mines and Geology, and U.S. Geological Survey for vegetation issues.

Funding: Local, State, Federal -- Form a "funding" consortium within 60 days following the release of this report.

Schedule: Oakland-Berkeley Hills -- begin immediately. Statewide -- encourage to begin before the 1992 fire season.

Work Element #2: Establish minimum fire safe standards for existing and new development in urban-wildland areas and all high fire hazard areas statewide.

Background: The Fire Safe Guides (Appendix C) have served as the basis for statewide legislation and regulation. Many of the measures contained in the Guides have been mandated by State law in State Responsibility Areas (SRA). However, property on the urban-wildland boundaries of incorporated cities and unincorporated lands not covered by SRA are specifically exempted from SRA and, therefore, not required by state law to implement appropriate PRC standards. Cities may use the "Uniform Fire Code" or develop their own ordinances.

Most elements of the Fire Safe Guides are appropriate for use in incorporated cities having urban-wildland areas. Many incorporated cities have adopted codes and standards comparable to the Fire Safe Guides, others have not.

Future fire damage from events similar to the East Bay Fire should be drastically reduced if mandatory standards similar to the Fire Safe Guides are established for all urban-wildland areas of the State.

Lead Agency: Cities of Oakland and Berkeley

Funding: Special assessment districts in high fire hazard areas.

Schedule: 1992-1994

Work Element #3: Allow prompt, safe and orderly evacuation of fire threatened citizens and insure that emergency response units are able to gain access to the emergency scene. The following methods can be used in the rebuilding process for the Oakland-Berkeley Hills:

1. Prohibit parking on all roads under a minimum established width.

RECOMMENDATIONS

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2. Designate one-way roads.
3. Widen sharp or hairpin turns where possible.
4. Establish cut bank parking spaces where possible.
5. Widen narrow roadways where possible.

Background: Most of the twenty-five people killed in the East Bay Fire were trying to evacuate the fire scene (Figure 2).



Figure 2.

Roadways and access/egress are critically important issues, not only for the East Bay Fire, but for all other communities in urban-wildland areas.

The *Fire Safe Guides* and the Uniform Fire Code provide reasonable recommendations addressing access routes, roadway type, width, and grade. These recommendations are appropriate for new subdivisions and areas of extensive change. Application in areas of rebuilding should be considered to the maximum extent possible.

RECOMMENDATIONS

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Many urban-wildland communities, including much of the area to be rebuilt after this fire, have access and roadway systems not meeting the *Fire Safe Guide's* standards. Future fire damage and loss of life from similar conflagrations can be dramatically reduced if improvements can be made to existing roadways and if new development is required to meet the standards of the *Fire Safe Guides*.

Lead Agency: Federal, State and local government.

Funding: Federal, State and Local -- Address these major capital improvement projects (i.e., street widening) in a funding consortium to be established within 60 days of the release of this report.

Schedule: Before rebuilding has started in the Oakland-Berkeley Hills.

Work Element #4: Insure that fire protection agencies and water utilities are incorporated into planning stages involving land use and new development decisions in high hazard areas.

Background: Water distribution system requirements for fire protection should be included as an integral part of the local planning process including input into the general plan. These requirements should be the responsibility of the local planning agencies to coordinate with fire protection agencies and water utilities. Variances on this requirement should not be allowed.

Considerations could include landscaping, housing density, urban-wildland areas, water system fire flow and storage capacity, fire suppression capacity, fire fighting capabilities with portable/aerial/mobile units, local weather conditions, and capabilities of interagency response.

Lead Agency: Local planning agencies

Funding: Existing budget

Schedule: Before new or redevelopment occurs.

Work Element #5: Local governments should not waive the substantive provisions of local, state or federal codes, specifications, standards or environmental assessment requirements during reconstruction.

Background: Frequently the best opportunities for implementing hazard mitigation arise immediately after the disaster event. Hazard mitigation, while typically preventative in its outlook, can also be corrective, affecting structures and communities already damaged or at risk. Local officials are under enormous public pressure after a disaster to expedite the repair and reconstruction process and typically forego mitigation concerns.

Planning departments, city councils and supervisorial boards have an immediate need for good counsel and advice on techniques for incorporating mitigation into the recovery process. In addition, success in hazard reduction at the local level frequently depend upon the extent that mitigation is required by state or federal programs.

RECOMMENDATIONS

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“As a condition of receiving federal disaster aid, Section 409 of the Disaster Relief Act requires that repairs or construction to be financed therewith shall be in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications, and standards...”

This is clearly **not** the time to consider waiving substantive building requirements to expedite the return to normalcy. Compromise of the substantive provisions of codes, specifications, and standards that have been established to protect public health and safety would propagate the very causes for much of the disaster. The state and federal government recognize that in some cases current codes may not be achievable in every respect (the lot is too small, etc.) but that as much of the existing code should be met as possible, with the emphasis on **safety**.

On the other hand, waiving selected procedural requirements to expedite the permitting process is not only acceptable, but laudable.

Lead Agency: Local, state, and federal regulatory agencies.

Funding: “Undefined Cost Ramifications” -- Existing budgets, plus state and federal disaster grants, SBA grants to assist individual homeowners to upgrade home construction to reflect current codes and standards.

Schedule: Immediate attention by local jurisdictions before issuance of building permits.

Work Element #6: Adopt most recent edition of the Uniform Building Code as prescribed in the State Building Code. Berkeley and Oakland should also adopt, in those areas designated as High Hazard Areas, more restrictive building ordinances (spelled out in 1980 Fire Safe Guides).

Background: At present the Uniform Building Code (UBC-California edition) does not differentiate building standards for those structures located in wildland fire hazard areas from those structures that are not. The UBC is a mandated code in California, but communities may select which version (current or previous years') or portion of the UBC they choose to adopt. However, local jurisdictions can pass ordinances to make building standards more stringent, based upon local conditions.

Lead Agency: State Fire Marshal's Office, with cooperation from CDF, to take the lead in the formulation of statewide minimum standards, encouraging local government to adopt existing standards.

Budget: Undetermined -- Local government use existing budgets.

Schedule: Immediate consideration before permits are issued for rebuilding.

Work Element #7: The cities of Berkeley and Oakland should adopt an ordinance that requires, as a minimum, Class C roof coverings. The cities should adopt more stringent requirements (Class A) for areas identified as High Hazard. Wood roof covering materials thus would not be allowed in areas designated as high hazard or greater.

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Background: At present California has adopted a Class C non-combustible requirement only for lands within the State Responsibility Areas. Local jurisdictions (cities, districts, counties) may adopt more stringent requirements. The last three major fire declarations (FEMA-739, 815, and 872) have shown that combustible roofing material is one of the major reasons for loss of structures (Figure 3). Generally, local governments have prohibited combustible roofs only after major urban-wildland fires have resulted in losses, both human and structural, that were politically unacceptable.



Figure 3.

High hazard areas are determined by evaluating many factors, including, but not limited to, the following: access, topography, density, vegetation, building type(s)/use, fire history, service levels (fire department response), and water supply. (See Work Element #8)

Lead Agency: Local government, State legislature.

Budget: No Direct Cost; undefined cost to permittee.

Schedule: Immediate, before permits are issued to rebuild in the cities of Oakland and Berkeley.

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Work Element #8: Update, expand and distribute existing Fire Hazard Severity Zone maps for each jurisdiction (local district, city, county, region) affected by the East Bay Fire.

Background: Updated Fire Hazard Severity Zone maps need to be available to jurisdictions to update the Safety Element of their General Plans and implement fire safety codes. The maps should be legally descriptive with fire hazard area boundaries superimposed on roads, utility lines, streams, and other landmarks and address the following:

- Areas of high elevation and upwind of urban structures which are vulnerable during critical fire danger warnings (e.g., the area north of Highway 24 in the 1991 East Bay Fire) should be designated at the highest hazard level possible under current code.
- Fire spread potential by firebrand spotting far down wind of the active fire must be considered in determining classification.
- Other parameters include site access, topography, building density, vegetative types and fuel loading, building use, fire service, water supply, and fire history.

Lead Agency: Local jurisdictions

Funding: Existing Budgets

Schedule: Immediate, for use in the implementation of fire safety codes.

Work Element #9: Ensure that the critical fire danger watches or warnings produced by National Weather Service's *Red Flag Program* are disseminated beyond those already receiving them, especially to appropriate fire response and water supply agencies at the local level.

Background: The National Weather Service *Red Flag Program*, available through national or state Fire Weather Service Agreements to a myriad of federal and state wildland fire protection agencies, is intended to highlight as far ahead as possible those critical fire weather patterns that produce extreme fire danger.

The *Red Flag Watch* stage alerts the user agencies that those critical fire weather patterns are indeed developing and that extreme fire danger and/or fire behavior is possible. A Watch is issued at least twenty-four hours ahead of time and possibly as far ahead as seventy-two hours. A *Red Flag Warning* is issued within twenty-four hours of occurrence. A Warning tells the user agencies that critical fire weather patterns are occurring or imminent. The Governor's Office of Emergency Services, Fire and Rescue Division, provides Red Flag updates to all Fire and Rescue Operational Area Coordinators within the Mutual Aid System. CDF, as a user agency, notifies their Ranger units and the local fire districts or jurisdictions who have contracted with CDF to assume responsibility for State Responsibility Area lands.

The *Red Flag Program* is a valuable program, particularly for California and the western states. Nevertheless, the program has been targeted for elimination every year since 1981. Each year, Congress

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has acted to restore funds. In order to be effective, the Fire Weather Program must continue at current levels. The National Weather Service's recently initiated modernization and associated restructuring of the agency will determine the future of the *Red Flag Program*.

Lead Agency: National Weather Service, Governor's Office of Emergency Services, California Department of Forestry and Fire Protection, regional and local fire response agencies.

Funding: Existing Program Funds

Schedule: Continuous

Work Element #10: Provide community "fire safety program" information for residents in urban-wildland high fire hazard areas. Organize a committee of public information officers and/or fire prevention specialists to develop such a program from existing materials and develop distribution methods to reach as many affected people as possible. Distribution avenues can include local planning/permitting agencies, lending institutions, and homeowners' associations, schools, churches, park districts and Neighborhood Watch Programs.

Background: Fire protection is a partnership between property owners, residents and fire protection agencies. Property owners and residents must take more responsibility for their own safety if they choose to live in wildland areas. Homeowners living in or near heavily wooded areas can help minimize the impact of wildfire by taking appropriate steps.

Educating residents in affected areas and adjacent communities to implement the necessary actions to be "fire safe" can greatly reduce the devastating impact of future fire events.

Various organizations have developed numerous public education materials. By drawing upon these resources, public education/information officers and fire prevention specialists can design a program to help people who live in the wildlands learn to protect themselves and their property from wildfire.

Lead Agency: Federal, state and local agency public education/information officers and/or fire prevention specialists organized into a task force to compile existing information and develop model materials appropriate for affected areas in California. Both CDF and OES will have a major role, as OES Fire is the principal support for ICS through its "FIRESCOPE" program.

Funding: Existing program funds; Hazard Mitigation Grant Program.

Schedule: Ongoing

Work Element #11: Enhance training related to the process of obtaining and using mutual aid at the local, state and regional level.

Background: Wildfire and other major incidents require coordination, cooperation and commitment at all levels of government. Metropolitan, urban and regional fire fighting agencies must implement

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mutual aid within the local operational area. The emphasis should be on training incident commanders to recognize that mutual aid procedures need to be activated early on. To accomplish the above requires an understanding of mutual aid procedures and works best when used in conjunction with ICS where possible.

The California Master Mutual Aid Agreement provides the contractual authority, when signed by the participating organization, to provide necessary assistance to affected areas during a disaster. This multi-agency agreement allows for an integrated response to fire mitigation through cooperative efforts by individual fire agencies.

Lead Agency: Multiple federal, state, regional and local fire agencies in a task force format.

Funding: Existing agency budgets.

Schedule: Within six months.

Work Element #12: Meet with Federal Housing Administration, Veterans Administration, and Farmers Home Administration to evaluate the adequacy of current application review procedures and underwriting practices on new residential construction as they relate to urban-wildland fire hazard exposure. Federal loan guarantee and lending institutions need to take into account the implementation of fire safe practices as they relate to their lending practices in urban-wildland areas.

Background: Fires occurring in urban-wildland areas are most likely to involve single family or low density, multi-family development. The fire potential in these areas varies widely throughout the State of California. The degree of hazard depends upon a number of natural and institutional factors. These include vegetation, climate, and topography, local land use policies, construction practices, site design, and fire fighting capability. Thus, the risk exposure to the federal interest varies from location to location and jurisdiction to jurisdiction.

Lead Agency: FEMA, U.S. Housing and Urban Development/Federal Housing Administration, Veterans Administration, Farmers Home Administration.

Funding: Existing budget.

Schedule: Before the 1992 fire season.

Work Element #13: Local decision makers should be cognizant of the potential flood risks to downslope residents not directly affected by the fire. Conduct a restudy of the fire disaster area to determine the hydrologic and hydraulic effects within the watershed and on the flood carrying capacity of streams and channels. Prepare revised Flood Insurance Rate Maps (FIRMs) if the restudy supports a remapping.

Background: A fire could affect the hydrology of the watershed(s) by increasing the ratio of total rainfall going toward direct runoff and reducing the amount of infiltration. This change in hydrology in

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turn affects stream hydraulics by producing more in-channel runoff than was experienced before the fire.

Runoff from denuded hillside/watershed areas would increase and often exceed the flood carrying capacity of local drainage systems and therefore expose downslope structures to increased flood risk and damage. Such runoff conditions could modify currently defined 100 year floodplains and place other areas at flood risk.

The pre-fire FIRMs, therefore, may no longer be appropriate for administering the community's Floodplain Management ordinance. Depending on the fire affected area, either a restudy or a Limited Map Maintenance Program (LMMP) would be undertaken.

Lead Agency: Federal Emergency Management Agency, local planning agencies, local flood control districts, Department of Water Resources, U.S. Army Corps of Engineers

Funding: Local input; Federal Emergency Management Agency re-mapping funds.

Schedule: Complete an LMMP within a year of the fire disaster. Do a restudy and have new FIRMs within 2 to 3 years.

Work Element #14: Alameda County should enter into discussions with the cities and major special districts (such as East Bay Regional District Park, East Bay Municipal Utility District, flood control districts, and Alameda County Transit District) in the county to assess the effectiveness of Operational Area coordination during emergencies and the obstacles to such operation.

Background: The Operational Area is an integral link in the existing fire and law enforcement mutual aid systems for coordinating intra-county resources and for forwarding information and resource requests to subsequent levels in the system. The State is strongly encouraging counties to work together with their cities and special districts to implement the Operational Area for other elements of the emergency management and response organization.

Alameda County considers itself a peer to the cities in the county for the unincorporated areas but does not serve a coordinating role as an Operational Area during emergencies. Communication with major special districts that had key roles in the response to the East Bay Hills fire would have been improved had they been a part of a county Operational Area.

Lead Agency: Alameda County, its cities, and special districts.

Funding: Funding not necessary

Schedule: Within three months

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Recommendations For State And Local Hazard Mitigation Planning

Recommendation #1: Insurance companies generally react to problem losses rather than taking preventive actions to mitigate or avoid these losses. Fire insurance rates should directly reflect the fire risk. At the same time, homeowners must be encouraged to implement the Fire Safe Guides for residential housing.

Background: If people choose to live or build in areas of high or extreme fire hazards, their fire insurance rates should reflect this decision. To help mitigate these higher fire insurance premiums, discounts could be offered to homeowners for implementing specific fire safety precautions such as Class A or B roofs, inside sprinkler systems, adequate clearing of vegetation, and the remaining fire preventive measures found in the Fire Safe Guides.

The State Fire Marshal's Office should work with the Governor's Insurance Coordinator to complete this task.

Differential insurance rates could be an important incentive for homeowners to take those first critical steps to protect their homes and families from wildland fires.

Recommendation #2: Develop and provide new basic fire fighter training standards and Incident Command Systems training as follows:

Continue cross-training on wildland fire fighting for metropolitan and urban fire fighters and structural fire fighting techniques for wildland fire fighters.

Include the Incident Command System (ICS) in all new training curricula at all levels, with increased training delivery schedules. Basic training in the ICS should also be provided to all other appropriate emergency response and management personnel.

Background: Fire fighter training standards and curricula are approved and adopted by the California State Board of Fire Services, after development by various fire agencies and organizations. It has been observed that some basic fire fighting curricula, especially those of metropolitan and urban fire departments, contain very little training on wildland fire fighting. Conversely, some wildland fire fighting agencies do not train in structural fire fighting. With the advent of the California Fire and Rescue Mutual Aid Plan, it is quite obvious that the two

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basic types of fire fighting organizations become intermingled during major fire and earthquake incidents. Instruction in the ICS, developed and used by the various wildland fire fighting agencies for many years, has been included in training curricula for all types of fire fighting agencies. Nevertheless, structural fire fighting agencies may not have had the same level of exposure to this training. While fire agencies have been the primary users of the ICS, other emergency response agencies and organizations could benefit from implementation of ICS. Such training will allow those entities to better integrate with fire fighting agencies.

Recommendation #3: Increase the availability of state and federal emergency management training to foster greater participation by elected officials. Emphasize clarification of roles to reduce confusion and overlap of responsibilities during emergencies.

Background: Most local government administrators, especially elected officials, will only participate in emergency management training that is offered locally and in one or two day increments. Time and cost pressures keep political and top-level decision makers from pertinent emergency management training. During emergencies, elected officials with little or no training or role definition may inadvertently project themselves into command operations in a manner not complimentary to the overall control of the emergency response effort.

Recommendation #4: Construct fuel breaks and develop green belts to separate communities, clusters or groups of structures from wildlands for all areas with high fire hazard severity ratings.

Background: There is potential for providing common fire protection in some areas through the placement of fuel breaks and green belts. Fuel breaks are areas of natural vegetation which are selectively thinned, then maintained to reduce fuel volume. All vegetation need not be removed in many cases, only thinned or landscaped to reduce fuel volume. "Firebreaks" on the other hand, are devoid of any flammable fuel, such as a freeway, river or lake. Both fuel breaks and green belts are located to protect developing areas and adjacent wildlands.

The most advantageous location and design must be determined site by site taking into consideration:

1. Population trends;
2. Fuel loading; and,
3. Topographic, geologic, and soil data to identify areas where erosion, and landsliding problems could be exacerbated by installation and maintenance of fuel breaks.

Recommendation #5: Studies of prescribed burning and fuel reduction of dense brush and trees should be performed by a cooperative arrangement between Oakland and Berkeley Fire Departments, the University of California, East Bay Municipal Utility District, Bay Area Air Quality Management District, CDF, and the East Bay Regional Park District. The studies should examine:

- Vegetation characteristics such as species distributions, vegetation densities, age classifications, proportions of dead fuel, and litter accumulations.

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- The safety of prescribed burns for reducing fuel loads and identifying areas where prescribed fire would be most effective in reducing the hazard from wildfire.
- Conditions when smoke emissions would be the least environmental damaging.
- Coordination of prescribed burning with other fuel management alternatives, including but not limited to fuel breaks, animal management, mechanical clearance.
- Alternatives to prescribed burning (such as manual clearing, goats, etc.) should be evaluated and, where possible, a cost effectiveness analysis should be performed to identify the most effective practical alternative.

The results of the study to be presented to public agencies, legislators, and local governments.

Background: Fuel build-up has not been managed for much of the land within and adjacent to areas of urbanization in the Oakland-Berkeley Hills. The accumulated fuel was a major element in the rapid spread of the East Bay Fire. Although most of the fuel has been consumed within the fire perimeter, adjacent and nearby areas have dangerous fuel loads.

Prescription for vegetation management burns in the Oakland-Berkeley Hills should be based on safety to residents and structures and fuel loads in the area as well as on soil, bedrock, and hydrologic conditions. Prescribed fire would be a long-term vegetation management tool, not a one-time event. The individual burn areas should occupy only a small portion of individual watersheds to form, where possible, a mosaic vegetation structure.

Recommendation #6: Develop a formal agreement between the State of California, the National Weather Service and the U.S. Geological Survey to provide statewide warnings to the public of potential mud slides.

Background: In recent years, the National Weather Service in Redwood City and the U.S. Geological Survey in Menlo Park have joined to operate a watch/warning system to alert the public in the Bay Area of the potential danger of mud slides. Unstable hillsides (U.S. Geological Survey expertise) and heavy rains (National Weather Service expertise) have combined to cause dangerous, sometimes deadly, mud slides. After a major fire, such as the East Bay Fire, the potential in the burn area for debris flow or mud slide is even greater due to the denuded slopes.

Representatives from both agencies coordinate the issuance of a watch or warning for these potential mud slides under the National Weather Service's Flash Flood Procedures. This cooperative effort has worked well in the Bay Area, and should be expanded to other parts of the state.

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Recommendation #7: Identify and develop alternate sources of water for local fire protection agencies. Considerations in developing alternative water distribution capabilities for fire protection should include the following:

1. East Bay Municipal Utility District should consider installing permanent diesel generators in fireproof buildings at pumping stations;
2. An above ground portable water delivery system that would allow pumping of available water over long-distances should be considered by local fire fighting agencies;
3. Identification of secondary sources of water including swimming pools, cisterns, and water impoundments in addition to pumping connections for extraction and distribution;
4. Discussion, negotiation and closure regarding the incompatibility of hydrant connections in Oakland with other fire districts; and,
5. Review of existing Health and Safety code provisions for effectiveness.

Background: Water is the single most important factor in fighting structural fires and wildland fires. It is essential that an adequate supply of fire protection water be available during peak consumption conditions along with adequate pressures, storage capacities, and secondary sources of power for pumping. Facilities and/or locations such as cisterns, storage tanks, community swimming pools, water impoundments with accessibility and pumping connections for extraction and distribution must be exploited.

A portable above ground water supply system was provided by the San Francisco Fire Department during the disaster event. The Governor's Office of Emergency Services, Fire and Rescue Division, has a "special hose and relay pump system" (SHARPS) available upon request.

During the East Bay Fire, some of the problems with water supply developed because (1) electric power to East Bay Municipal Utility District pumping stations was interrupted; (2) fire hydrant connections were not compatible with hose connectors from other districts; and, (3) the sheer number of pumping units overwhelmed the water capacity of the distribution system.

Recommendation #8: The California Department of Forestry and Fire Protection, Governor's Office of Emergency Services, and Office of the State Fire Marshal should explore and coordinate the development and use of Geographical Information Systems (GIS) for hazards identification and monitoring of vulnerability changes. Emphasize information sharing between local, state and federal planning and emergency management agencies. Ensure appropriate and effective representation of emergency management issues on the State Geographic and Land Information Systems Task Force.

Background: Assembly Bill 429 (PRC 8900, Chapter 782 of 1991) establishes a Geographic and Land Information Systems Task Force charged with delivering recommendations to the

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Governor by October 1992 on the effective use and coordination by state agencies of Geographic and Land Information Systems technology.

Senate Bill No. 27 passed in October 1989 requires the Governor's Office of Emergency Services, in cooperation with the Department of Forestry and Fire Protection and the State Fire Marshal, to establish and administer the FIRESCOPE Program for improving fire fighting resources. One of the research, development and implementation objectives is targeted towards a common mapping system, including orthophoto maps.

Recommendation #9: Enforce the requirement for all fire protection entities with jurisdiction over urban-wildland structure loss fires to file an exposure fire report on each damaged or destroyed structure through the California Fire Incident Reporting System (CFIRS).

Background: The extent and severity of the urban-wildland structure loss problem requires continuous and comprehensive tracking through basic fire incident reporting. Such reporting data can provide valuable support for building code development, research, and fire loss reduction recommendations.

Health and Safety Code Section 13110.5 requires the State Fire Marshal to prescribe the scope of fire loss data collection to be performed by each fire protection entity in the state. The CFIRS manual (ver. 1.0, 1990) states that a separate incident report must be submitted for each exposure fire (i.e., a fire in a building, structure, or vehicle, resulting from a fire outside that building, structure, or vehicle).

Data collection should be incorporated as a function of the emergency incident management organization where possible.

Recommendation #10: Enforce existing disclosure requirements on individual parcels of property prior to the initiation of the loan application process. Likewise, existing disclosure requirements should be examined to evaluate possibility of addressing broader issues than present regulations cover.

Background: Under existing California law (California Civil Code Section 1102), a seller of real property must disclose to the prospective buyer certain physical conditions relating to the structure, issues of responsibility, items of deficiency and other information relating to the location of flood plains and earthquake faults. This requirement is a positive step toward educating new residents of the hazards of living in urban-wildland areas. This disclosure is intended to improve a new homeowner's awareness and understanding as it relates to wildland fire protection and fire prevention requirements.

Recommendation #11: Establish a comprehensive list of minimum fire hazard and related geologic hazard mitigation standards, indicating which are mandatory and which are guidance.

Background: Much confusion exists regarding required statewide standards of agencies involved in emergency management, public safety, fire protection, resources management, and planning. Without a comprehensive list of minimum standards, it is unclear which standards are

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truly mandatory, optional, or locally relevant. To eliminate such confusion, a list of state and federal fire hazard mitigation standards and regulations must be developed distinguishing requirements from guidance.

Recommendation #12: Develop and implement a program of microzones detailing geographic hazards. Initially use available data and follow up with original work as appropriate.

Background: The program could be modeled after the successful Alquist-Priolo Special Studies Zones, but would probably include more categories or overlays. Fire, geotechnical, seismic, flood, and other hazards would be considered. The microzones would be defined by a consortium of appropriate governmental agencies. Based on the microzones, a gradation of building standards, mitigation and enforcement priorities would be developed. Finally, institutions of government, finance, and insurance should be encouraged to take this information into consideration whether planning, financing, insuring, developing policy, rebuilding, building, or developing raw land.

Recommendation #13: Enhance the strategic planning effort by conducting a “multi structure vulnerability analysis” to identify the relative degree of threat posed to/by multiple structures. The maps and analyses could be used by Incident Command Teams to help form fire suppression objectives and strategies.

Background: Specific threat areas can be analyzed and prioritized in terms of vulnerability. The mapping process “makes visible” those areas where strategic fire defense improvements are most needed.

The analysis is not intended to replace or modify existing tools. It is intended to bridge the gap between these procedures. The analysis is intended to rate groups of structures in terms of life and property protection potential and difficulty of fire suppression in the area. Development areas can be rated on a scale ranging from “low” to “very high” vulnerability.

Once rated, the selected area(s) can be mapped and the ratings can be used to:

- set appropriate mitigation requirements for new development;
- assist in determining fire defense systems for existing development;
- provide the “big picture” showing the relationship and relative vulnerability of contiguous areas;
- determine appropriate initial and follow-up dispatch levels; and,
- provide clear and concise information for public planning commissions and local government decision makers.

This recommendation is related to Mitigation Measure #24 in the State Hazard Mitigation Plan.

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Recommendation #14: Update the CDF's *Defensible Space Factor Study of 1989*.

Background: The California Department of Forestry and Fire Protection's *Defensible Space Factor Study* was initiated in 1989 to collect information on structures exposed to wildland fires. This information needs to be updated to include new urban-wildland areas. This information could be used to meet other organizational needs to avoid unnecessary duplication, and a compile data base for structure loss analysis and modeling.

A modified version of the study's data collection form was used on the Paint Fire (Santa Barbara County, 1991) to collect data on 900 structures. It was also used on the East Bay Fire in the Oakland-Berkeley Hills. *The Defensible Space Factor Study* was modified to gather as much information on a "One Stop" gathering plan.

The information being assembled by the damage assessment teams on the 3,354 single family residences and 456 apartments damaged or destroyed will meet the goal set by the. *The Defensible Space Factor Study* extensive interagency cooperation between the cities of Oakland and Berkeley are examples of support needed to build a useful data base, to lessen the chances of this type of disaster occurring elsewhere in California.

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Fire Safe Guides

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**FIRE SAFETY GUIDES
FOR RESIDENTIAL DEVELOPMENT IN CALIFORNIA
(In or Near Forest, Brush and Grassland Areas)**

To be used by:

Planners
Developers
Fire Agencies

Revised and Printed
by
California Department of Forestry

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INTRODUCTION

California, because of its unique combination of vegetation, topography, climate, and population, has one of the most severe wildfire problems in the world. Rugged terrain and highly flammable vegetation make the foothills and mountains of California especially unsafe for residential development unless adequate fire safety measures are taken. However, fire safety measures can reduce the exposure of life, property, and resources to an "acceptable level of risk" and provide "defensible space" that could protect residents and enable firefighting equipment and personnel to operate during a wildfire.

These guidelines should be used as an aid when counties and cities are preparing or revising their general plans to meet requirements of Section 65302 of the California Government Code.

Measures to reduce potential loss of life and property in areas of high fire hazard include enforcement of fire safe building codes, construction of adequate road and water systems, land-use planning and zoning to guide development in those areas.

This guide offers local government planners and developers basic information and fire safety standards so that land-use policies and zoning criteria can be developed to help reduce the possibilities of wildfire disaster.



FIRE PROBLEM

Topography

The rugged terrain in California has a great effect on wildland fire behavior and the suppression capability of firefighters and their equipment. Three-fourths of the state is rolling foothills and rugged mountain areas. In places, elevations increase from near sea level to above 5,000 feet within a few miles and many mountain areas are slashed by deep canyons. This rough topography greatly limits road construction and accessibility for firefighting equipment. Initial attack travel time by road and trail from the suppression station to a fire sometimes exceeds 2 hours. A fire that starts in the bottom of a canyon may rush quickly upward to the ridge before initial attack forces can arrive.

Typical Mountain Topography



Climate

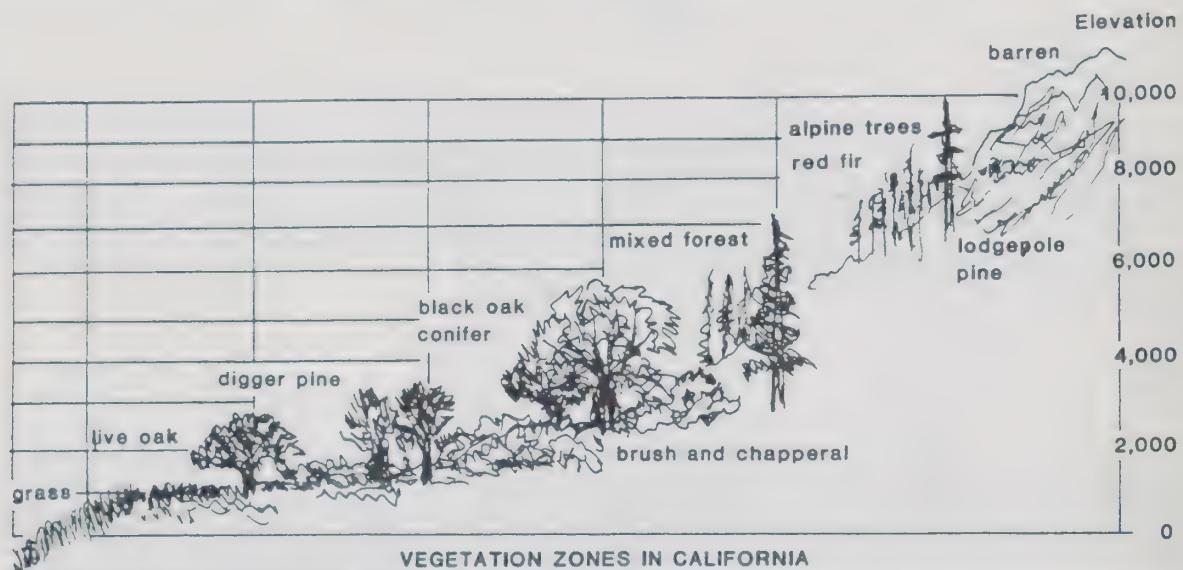
Most of California has a semiarid Mediterranean-type climate of mild winters and hot, dry summers. Little or no rain falls from April through November or December. During the fall and winter months, it is not unusual for strong winds to blow in from the north and east. These drying winds may exceed 70 miles per hour and reduce fuel moisture and humidity to minimum levels. Drying winds evaporate the beneficial moisture of rain, thereby creating fire weather conditions even during the winter months. As a result, disastrous fires can and do occur during every month of the year in California.

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Vegetation

Only 14 percent of California's 100 million acres is urban or agricultural land. Another 25 percent is desert or barren mountain areas high above the timberline. The remaining 61 percent of the state is covered by forest, woodland, brush or grassland. The native vegetation becomes flammable during summer and remains so if drought conditions prevail during the winter months.



This vegetation includes a wide variety of highly flammable natural growth that also makes attractive landscaping for homesites. Under prevailing dry climatic conditions the vegetation is ignited easily and burns with great intensity. Periodic drought can also create areas of dead or dying vegetation due to insufficient moisture for sustained normal growth. A high ratio of dead to live vegetation increases the heat output of wildfire.



Homesites in Highly Flammable Natural Growth

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Human Use and Occupancy

Human use and occupancy of the forest, watershed and range lands is growing steadily under the pressure of California's highly mobile, urbanized and expanding populations. During the period 1940 to 1964, population increased from 6.8 million to 18 million. In 1970 the population totalled 20,026,000 and is predicted to rise to 22,659,000 in 1980 and 26,098,000 in 1990.

Each wildfire, especially near the settled areas, is a potential conflagration that can threaten human life, structures, and resource values. Urban development has moved into wildland areas (foothills, mountain slopes, and canyons) where the hazard is severe and fire control is difficult. Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses and industries have been located within high fire hazard areas. The increasing demand for outdoor recreation means great numbers of people are in the wildlands during holidays, weekends, and vacation periods. Crowded conditions in the foothills and mountains result in dual exposure — increased risk to the wildland resource and increased threat to life and property from wildfires.

Unfortunately, despite recent efforts by state and local governments to impose fire safe regulations on homesites and developments, wildland residents are rarely prepared for the inferno that can sweep through the brush and timber and destroy their homes in minutes. Firefighters frequently find themselves protecting lives and homes while the wildfire's perimeter spreads rapidly out of control threatening many additional structures.



Wildfires Result to Homesite

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PLANNING NEEDS AND CONSIDERATIONS

Fire Hazard Classification

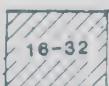
Although wildfire is a hazard wherever people and developments interface with the wildlands, the degree of hazard and the required amount of fire prevention and safety measures varies from area to area. A Fire Hazard Severity Classification System* based on three factors has been developed to provide land-use planners a practical and logical system for classifying the severity of fire hazard in California's wildlands. *Fuel loading* (the quantity of flammable vegetation and other fuel per unit of land area), *fire weather* and *slope* are the primary criteria for identifying and classifying the severity of the fire hazard in any given area. In order for planners, developers, and fire authorities to have a uniform understanding of the area of reference, these fire hazardous areas should be delineated on U.S. Geological Survey (USGS) topographic maps. These maps will serve as a basic tool in defining fire hazard severity and effective administration of Fire Safety Measures.

FIRE HAZARD SEVERITY SCALE *

CRITICAL FIRE WEATHER FREQUENCY →	I (1)			II (2)			III (8)		
	SLOPE %			SLOPE %			SLOPE %		
FUEL LOADING ↓	0-40 (1)	41-80 (1.6)	61+ (2.0)	0-40 (1)	41-80 (1.6)	61+ (2.0)	0-40 (1)	41-80 (1.6)	61+ (2.0)
	1	1.6	2	2	3.2	4	8	12.8	16
Light (Grass) (1)									
Medium (Scrub) (8)	8	12.8	16	16	25.6	32	64	102.4	128
Heavy (Woods-Brushwood) (16)	16	25.6	32	32	51.2	64	124	204.8	256



1-12.8 MODERATE HAZARD



16-32 HIGH HAZARD



1.2-256 EXTREME HAZARD

* Severity Factor Values are shown in Parentheses in the Table

Timing

Comprehensive land-use plans, prepared in advance of development, should be prepared and reviewed as soon as delineated fire hazardous areas are faced with development. In this way, problems can be resolved before the projected development is begun. Situations hazardous to life and property that are allowed to develop because of lack of land-use planning are generally beyond practical correction. In such cases, all concerned must acknowledge and be willing to accept the resultant level of risk and the inevitable damages from wildfire.

The "Fire Hazard Severity Scale" can be used by local government planners to classify degrees of fire hazard in wildland areas and specify conditions under which use and development of specific areas can take place. The classification system can also provide a base for detailed fire hazard zoning.

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Planning Unit Models

Fire protection planning should be carried out for large cohesive units in conjunction with planning drainage, soil erosion, flood control, and sanitation. Planning for fire protection is necessary for full and safe development of watershed areas. To illustrate this planning concept and the basic relationship of fire protection to the development of mountain land, local planning and fire authorities should develop examples of how planning could be applied to an actual problem area. Such examples or "area models" would encourage mutual understanding of fire planning principles between planners, land developers, builders, and regulatory agencies of government.



Major Development in California Wildland

Review of Development Plans

All proposed lot splits, subdivisions and other developments should be reviewed for fire protection needs by local fire agencies in a manner similar to that given by water, road, health, and flood control authorities. Planning recommendations should also be made for large scale housing and cluster or planned-unit developments, and not just for the traditional subdivision. In addition to new development plans, all variances and special use permits should be reviewed by the responsible fire agencies as well as other control agencies in order to provide the most acceptable levels of fire safety.

Recognition of Special Fire Problems

In establishing conditions for use or development of an area, local government planners should confer with the fire protection agency in whose jurisdiction the area is located. The fire protection agencies along with local planners will be able to recommend a comprehensive land use system which recognizes special fire problems and requirements related to vegetation, topography, weather, transportation systems, water supply systems, building density, hazard reduction, and risk. The overriding concern should be protection of life and property from wildfire and prevention of damage to adjacent watersheds and other natural resources. The cost versus risk analysis and economic impact of any recommendations should be considered.

Large Development Projects

During each phase of a large development project, in high fire hazard areas, the developer should be required to provide at least two access routes until all phases of development and the permanent road system can be completed. From the start to completion of a project the developer should be prepared to provide fire prevention and protection measures deemed necessary by the responsible fire protection agency. Current and projected fire protection needs, including fire facility sites, should be included in all development plans. Assurance Bonds of Performance can be used to be sure that developers provide fire safe measures that give new residents a reasonable level of protection. The amounts of Assurance Bonds should be sufficient to compensate for increased costs due to inflated values over the duration of the development. Mutual understanding of the fire and construction problems in the hazardous fire areas can lead to a degree of fire protection which would help both the construction industry and the fire protection agencies.

Location of parks, golf courses, utility corridors, roads, trees, and landscaping should be planned with a view to fire protection. The functional placement of greenbelts may reduce the vulnerability of a development to wildfire at little economic cost. Permanent greenbelts or fuelbreaks should be planned. Of course the responsibility for maintaining these fire protection areas should be assigned so that the benefits of such protection are guaranteed in the future.

Community Firebreaks needed in Subdivisions



Division of Land

In order to assure that fire safe standards are applied to high fire hazard areas developed outside of regular subdivisions, any division of land into two or more parcels for the purpose of lease, sale, conveyance, or transfer, whether immediate or future, and which is not defined as a subdivision, should also be subject to review by the appropriate fire protection authority.

Land Treatment of Wildland Areas

Land treatment measures such as fire access road, water storage, heliports, safety areas, firebreaks, fuelbreaks, and fuel management should be designed as part of an overall fire defense system to facilitate fire control. Fuel management modifies the threat posed by vast areas of vegetation either by reducing the available fuel (dead and fine living) in broad areas through prescribed fires, or by converting the vegetation to a type that is less hazardous. All wildland adjacent to an inhabited area should be treated and continuously managed to reduce conflagration hazard. Prescribed burning and other land treatment measures can break up broad expanses of vegetation into manageable segments. Wildland fire protection agencies should be encouraged to perform such land treatments. Cooperative land management planning efforts should be encouraged to develop land treatment systems and community firebreaks and facilities for the mutual defense of both the community and the wildland resources from wildfire.



RECOMMENDED FIRE SAFETY STANDARDS

The following standards are intended to be applicable to all wildland developments in fire hazardous areas including subdivisions, large scale housing, planned-unit developments, and recreational areas including development on federal lands. The need for protection of life, property and natural resources may require mitigating measures to reduce the risk of a wildfire to an acceptable level.

Recommendations for individual developments should vary with the degree of fire hazard severity and the combination of available mitigating measures that can be adopted.

Access/Traffic Circulation

Road networks either public or private should provide for safe and ready access for emergency fire equipment. Alternate routes of escape that will safely handle evacuations and emergency equipment should be established. Road and street systems should provide maximum circulation consistent with topography to meet fire safety needs. The following standards are recommended for subdivision developments:

1. Access Routes

Require at least two different ingress-egress routes;

2. Right-of-Way Road Width

- a. Require a sufficient right-of-way for the construction of two 12-foot traffic lanes, two 8-foot parking lanes and two 10-foot roadside strips on which the vegetation should be managed to prevent fire hazard. Responsibility for keeping roadside strips free of fire hazard should be assigned.
- b. In single or minor subdivision development, the main traffic lane width to all building sites should be at least 16 feet to allow emergency fire equipment access while occupants are escaping a wildfire. Also, turnaround access at the building site should be large enough to easily accommodate fire equipment.



Cul-De-Sac with Proper Road Width and Turnaround

3. Cul-de-Sacs

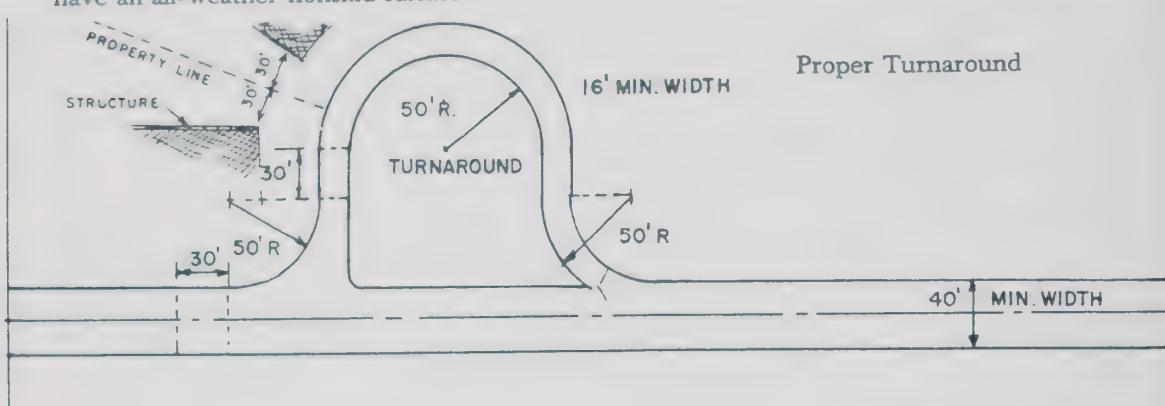
Limit cul-de-sacs length based on hazard severity classifications to 1,000 feet moderate, 800 feet high, and 600 feet extreme, terminated by a turnaround right-of-way not less than 90 feet in diameter.

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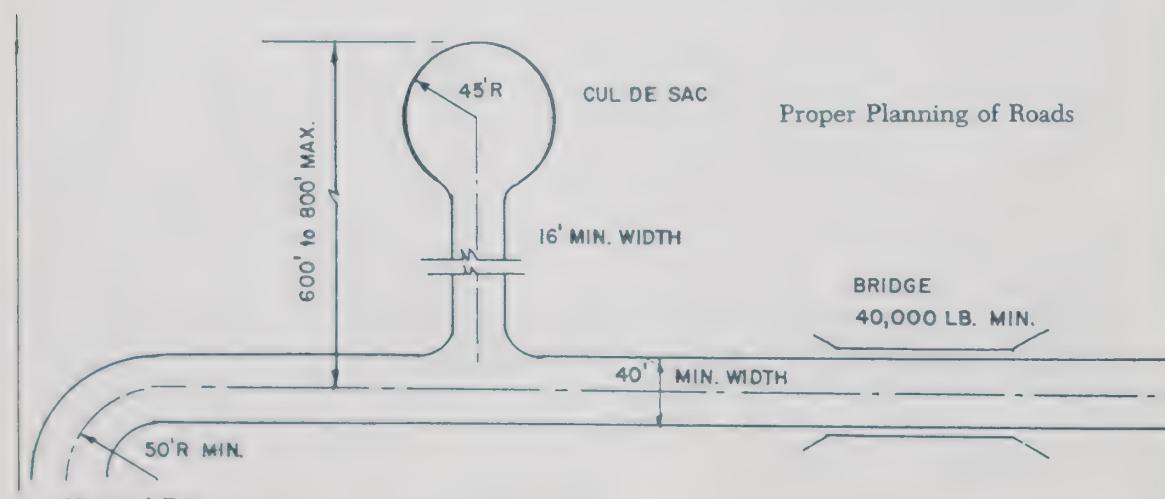
4. Street Grades

Street grades should be limited to 15 percent except for short distances when topographic conditions make moderate grades impractical. Any road grade in excess of 20 percent no matter how long should have an all-weather nonskid surface.



5. Street Radius

No street, or turnaround road should have a centerline radius or curvature of less than 50 feet.

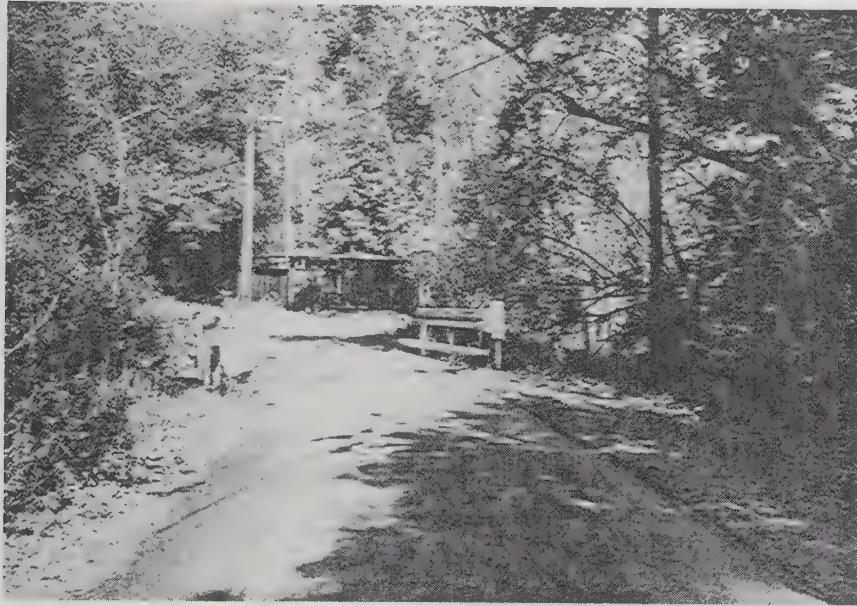


6. Vertical Dips

Vertical curves and dips in the roadway should have a radius of not less than 50 feet.

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Typical Rural Bridge

7. Bridges

Bridges should have a minimum load of 40,000 pounds (20 tons), and be no narrower than the driving portion of road serving each end. Major ingress-egress roads in subdivisions should have a minimum load limit on bridges of 80,000 pounds (40 tons).

Visible Street Address and Signs



Street, Road, and Building Identification – Names and Numbers

To facilitate fire location and to avoid delays in response, all roads, streets, and buildings should be designated by name or number on signs clearly visible from the main travelled roadway. As used in this section, "roadway" means that portion of a highway or private street improved, designed, or ordinarily used for vehicular travel.

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1. Buildings and Structures

Every building or structure shall be provided with an appropriate noncombustible marker located with respect to the nearest public highway, street, or road servicing such building or structure so as to be clearly visible at all times to an approaching vehicle for a distance of not less than 100 feet.



Structure Identification Numbers

In lieu of providing a separate marker and a separate building or structure identification number, the fire protection agency may recommend that a cluster of buildings comprising a single occupancy or a close grouping of several buildings use one marker and one identification number as a location identification.

Street and Road Identification Signs



2. Roads and Streets

Street identification markers should be provided by the county and the cost of installation and maintenance of such markers should be paid from the basic tax structure of the county. Street and building numbers must be not less than 3 inches high and not less than 1 1/2 inch in stroke. Every building or structure number required must be located or positioned not less than 3 feet nor more than 6 feet above the ground level so as to be visible to emergency equipment for a distance of not less than 100 feet.

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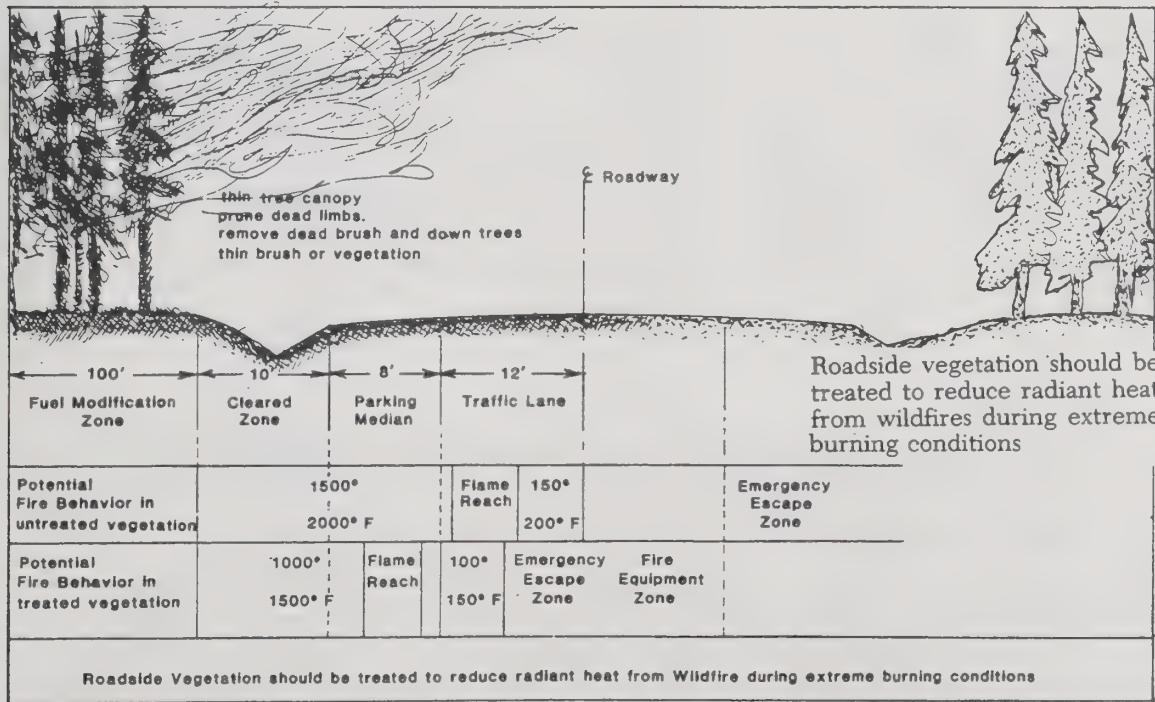
Roadside Vegetation

Roadside vegetation contributing to significant risk should be removed for a distance of 10 feet on each side of the travelled section. In order to protect escape routes from radiant heat caused by wildfires, the native vegetation should be thinned and dead material removed on each side of roads or highways. This may reduce radiant heat from a wildfire to an acceptable level.

Proper Roadside Vegetation Clearance



The clearance distances, type or amount of fuel management desired depends on local conditions, but as a minimum should extend at least 100 feet from the edge of the roadway to be beneficial as a fire defense system. Fire protection agencies can provide fuel treatment directions for planning purposes. Other methods of treatment include pruning specimens of trees, planting ornamental shrubbery and cultivated ground cover such as green grass, ivy, succulents or similar plants provided they do not form a means of readily transmitting fire.



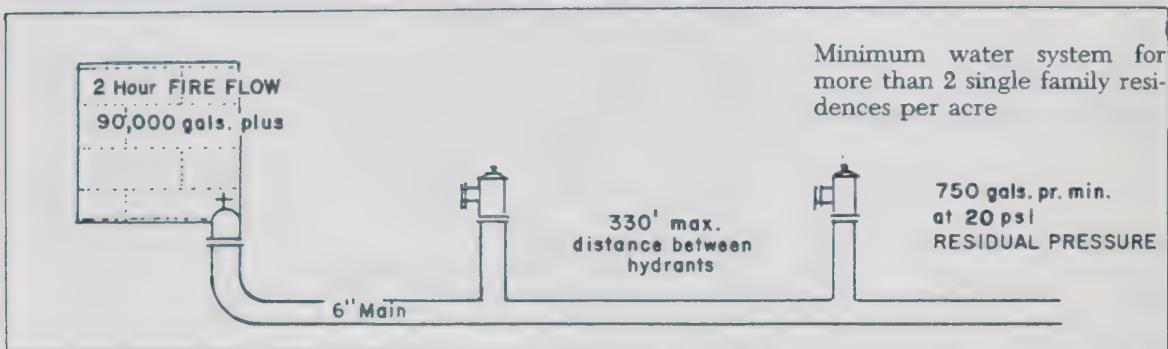
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Water Supply

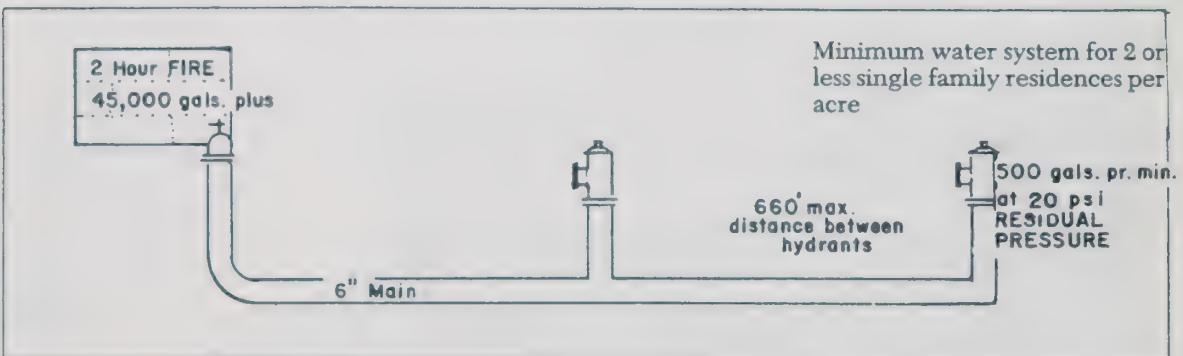
Effective May 5, 1975, the Public Utilities Commission of California issued revised General Order #103 which sets fire protection standards and services to be offered by public utility water corporations. These water system design requirements must be addressed by developers, planners, fire agencies, and other regulating agencies for any extensions, replacements or new installations of water systems.

Water is the most important single factor in fighting structural fires and is vital in suppressing wildland fires. Therefore, to assure adequate and reliable water supplies for community fire protection in hazardous areas, the following minimum requirements are recommended:



1. Water Mains

The minimum size of water distribution mains on which fire hydrants are located should be 6 inches in a system designed to permit circulating water flow.



2. Fire Hydrants

The size, type, and location of fire hydrants should meet the approval of the responsible fire authority and of applicable state and county regulations, with a minimum size of waterway not smaller than the size of the street main up to a nominal 6-inch size. A gate valve should be placed on the connection between main and hydrants.

Hydrant spacing should not exceed 660 feet with minimum fire flow of 500 gpm required for population densities of two or less single family residences per acre. For population densities of more than two dwellings per acre, hydrant spacing should not exceed 330 feet with a minimum fire flow of 750 gpm and more where structural conditions require. Fire flow quantities should be available at 30 psi residual pressure in extreme fire hazard areas and 20 psi residual in low, moderate or high areas. Water source facilities should have the capacity to support the required fire flow for a minimum duration of two hours *in addition* to the maximum daily flow requirements for other consumptive uses.

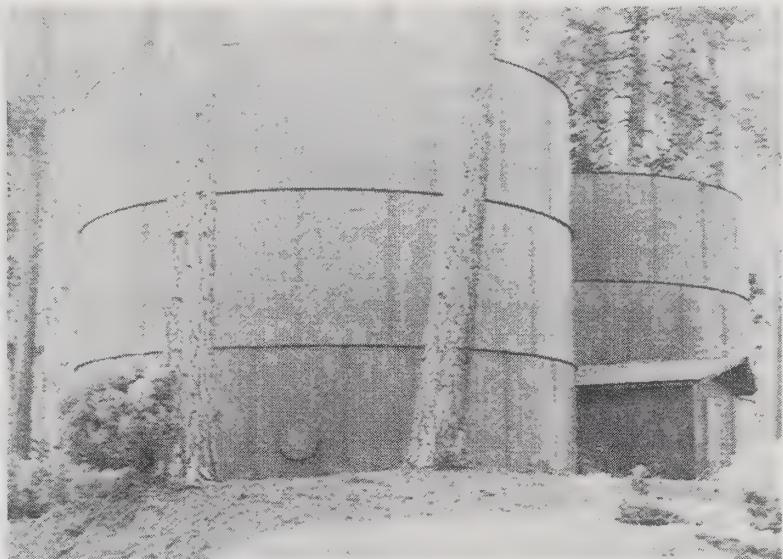
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3. Water Storage

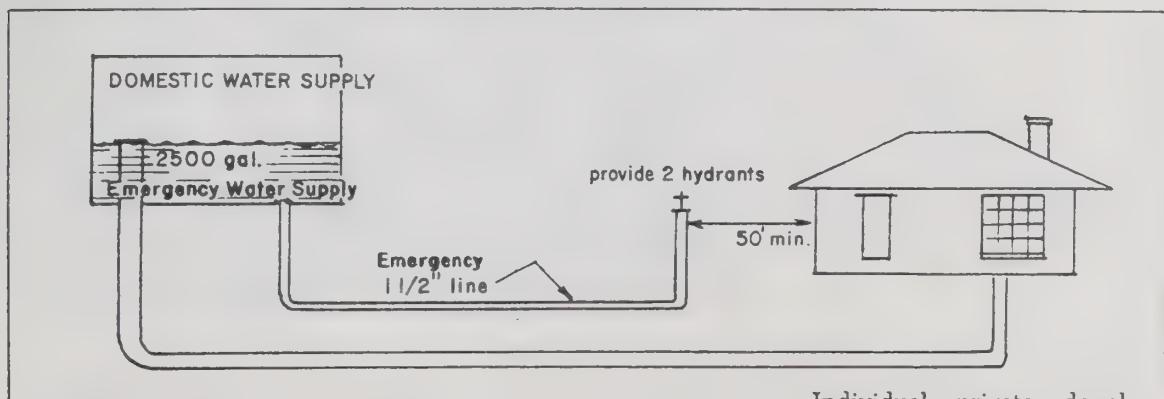
Water storage may be required to assure the required minimum duration fire flow of 2 hours. Built up areas served by pumping units with nonexistent or limited gravity storage may require certain other features of reliability such as alternate power sources, duplicate pumps or additional gravity storage in case of main breaks, mechanical failure of pumping units, or loss of primary power source. The local fire authority may adjust the water quantities and duration set forth on the basis of local conditions, exposure, congestion, and construction of buildings.

Water storage tanks to provide required 2 hour fire flow (water tank)



4. Private Water Supply

Separately developed dwellings with an individual private water supply should provide an acceptable guaranteed minimum supply of water, in addition to the amount required for domestic needs. The amount of water available for fire protection of structures will vary. Fire authority should be consulted to establish specific water requirements. Water storage capacity should not be less than 2,500 gallons, with supply mains of at least 1 1/2" diameter standpipe located for fire engine filling and at least two hose outlets no less than 50 feet from the building. If the water supply is dependent on an electrical pump it should be installed with an independent electrical system.



Individual private developments should be required to provide a minimum of 2,500 gallons of water storage capacity for emergency fire protection.

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5. Lakes, Ponds, Swimming Pools, Streams or Other Water Sources

Plan for fire equipment access. The equipment must be able to get within 16 feet of these water sources to effectively obtain the water. All plans should have these water fill or drafting sources noted.

Power Utilities System

All new or modified electrical distribution circuits and extensions of existing circuits in fire hazardous areas should be underground if possible.

Roofing

The roof is the most vulnerable part of a building during a wildland conflagration especially a roof that is horizontal because it can catch and hold firebrands carried by strong winds and convection columns characteristic of these fires. Unlike ground fire, a conflagration produces firebrands that travel over and beyond any natural or artificial firebreak and are a distinct hazard to structures as far as a mile away from the wildfire.

1. Tile Roofs

Tile roofs shall be fire-stopped with concrete or equivalent fire-resistive material to preclude entry of flame or embers.

2. Shake/Shingle Roofs

Thousands of homes and other buildings exposed to the threat of wildland fires are roofed either with untreated shakes or shingles or with shakes or shingles that were merely dipped in fire-retardant chemical. In many cases, the treatment has been leached by weathering. These roofs are not only serious hazards to the buildings on which they are installed but also to any other buildings downwind from them which are similarly roofed. Once the roof catches fire, the shakes or shingles peel off and are carried as firebrands by the convection column and wind.



Shake or Shingle Roofs are Fire Hazards

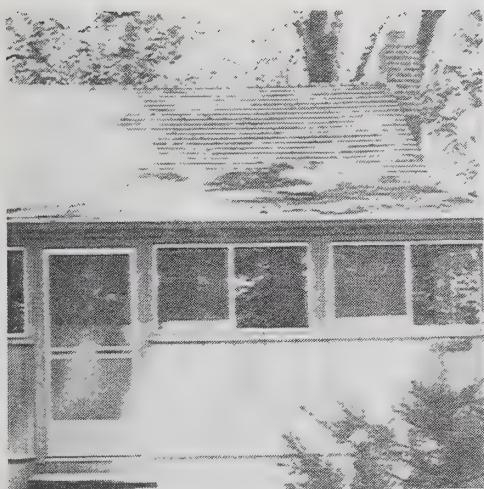
Recognizing this vulnerability to fire from external sources, the Uniform Building Code (UBC) requires "fire-retardant roof coverings" in or near the business sections of cities where property values and hazard to human life are high. A few local jurisdictions have amended the UBC or their own codes to require "Class C", a more fire resistant roofing as defined in UBC Standard 32-7 in hazardous wildfire areas. The zoning designations established for all roofs in the urban/rural interface and wildland areas should be in accordance with the following:

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Fire Hazard Severity Classification	Type Roofing Required*
Extreme	CLASS A
High	CLASS B
Moderate	CLASS C

*Uniform Building Code – Standard 32.7



Tile Roof



Composition Roof



Fire Retardent Treated
Shake/Shingle Roof

3. Roof Sprinkler Systems

Automatic roof sprinkler systems will not substitute for the required roof covering as these systems are too unreliable.

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Building Construction Standards

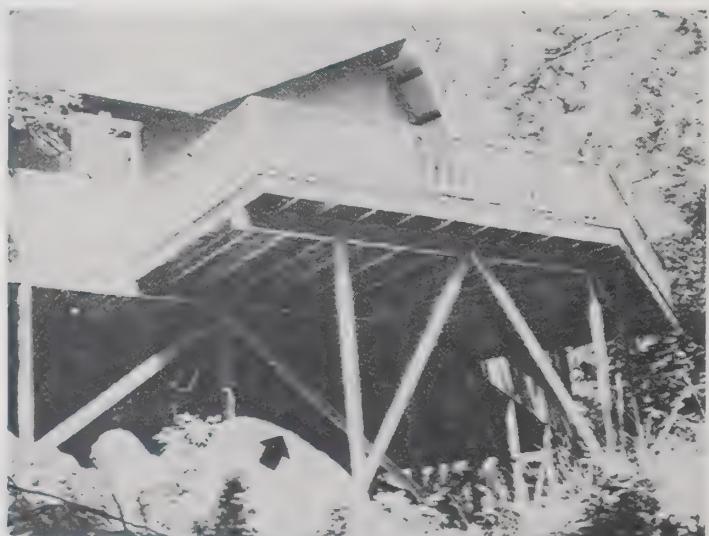
1. Uniform Building Code

Every building or structure shall be constructed to meet at least the requirements specified in Volume I of the current edition of the Uniform Building Code as published by the International Conference of Building Officials for the group and type of occupancy intended.

2. Local Regulations or Ordinances

Where more restrictive provisions are required by other statutes or by regulations adopted pursuant to statutory authority or by any local ordinance, the more restrictive provision shall supersede the requirements of the Uniform Building Code.

Typical cantilevered construction with unenclosed floors and rafters



3. Eaves, Balconies, Unenclosed Roofs and Floors

Combustible eaves, balconies, unenclosed roofs and floors, and other similar surfaces shall be protected on the exposed underside by materials approved for one-hour fire-resistant construction.

All supporting members, vertical, horizontal, and diagonal, used in stilt or cantilevered construction, shall insure for one-hour fire-resistant construction as set forth in Chapter 43, UBC, current edition, Volume I.

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4. Vents

Attic openings, soffit vents, foundation louvers or other ventilation openings in vertical exterior walls and eave overhangs, and vents through a roof should not exceed 144 square inches each and should be covered with 1/4 inch mesh metal screen that is noncombustible and corrosion resistant.

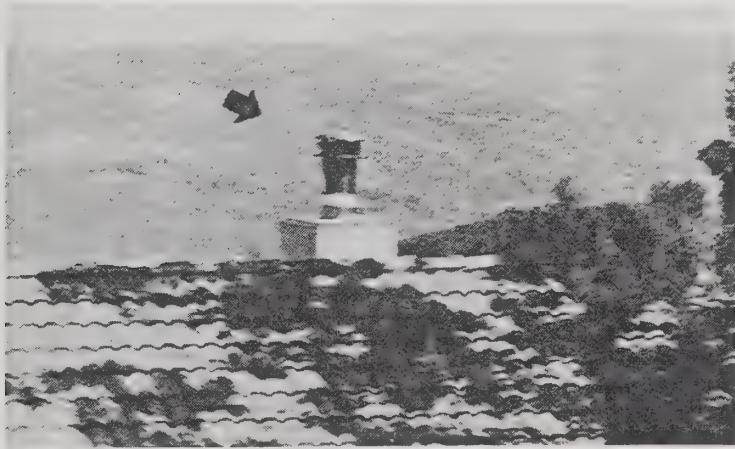
Properly screened vents and attic openings



5. Chimney

Every chimney or vent attached to any solid or liquid fuel-burning device shall be provided with an approved, securely attached spark arrester consisting of 12-gauge welded or woven wire mesh screen with openings 1/2 inch across. It is to be maintained in effective working condition. Such spark arrester is to be mounted in a vertical or near vertical position and visible from the ground (Public Resources Code 4291 c, f).

Chimney vent with spark arrester



6. Exterior Walls

Exterior walls of buildings and structures should be protected with materials of not less than one-hour fire-resistant construction on the exterior side. (See Table 43-B, Uniform Building Code). Such materials shall extend from the top of the foundation to the underside of the roof sheathing. Utility buildings not exceeding 100 square feet in floor area and separated from other buildings by not less than 50 feet may be exempt from this provision for protection of exterior walls.

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7. Rafters

The spaces between rafters, the wall plate line, and the underside of the roof sheathing should be filled with not less than 2-inch nominal thickness wood or equivalent solid blocking.



Unenclosed rafters with blocking

8. Windows

Consideration should be given to screening or restricting placement of large window surfaces toward fire hazardous areas. Large window areas exposed to extreme heat caused by encroaching fire can crack and break, allowing hot brands or radiant heat to ignite the inside of the house.

Large window surfaces facing fire hazards



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9. Existing Buildings or Structures

Existing buildings or structures need not comply with the provisions of this section except when alterations, repairs, or replacements are made amounting to more than 25 percent of the value of the building or structure to which the various subsections of this section apply.

Existing structures should comply if more than 25% of building is replaced



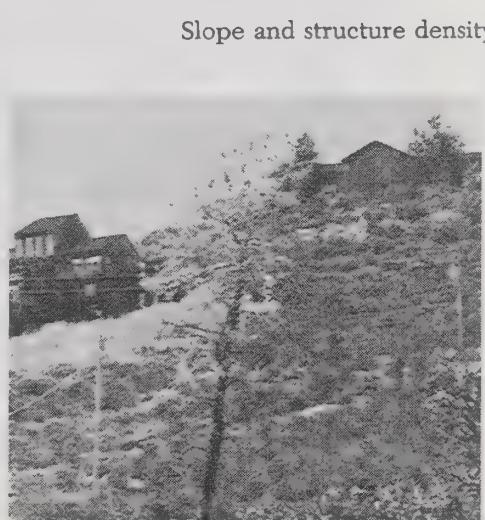
Building Spacing and Densities

Structure density and spacing requirements should be based on fire hazard severity classification and mapping.

To provide a reasonable degree of fire safety, building spacing density should be different in mountainous areas, wildlands and rural areas than they are in urban areas because the usual source of ignition of the structure in the wildland or rural setting is usually external.



Flat terrain



Slope and structure density

Slope has an important bearing on fire behavior through its effect on wind conditions and heat radiation. Consequently, and irrespective of vegetation clearance requirements, more space between structures should be required in mountainous areas than on valley floors and coastal plains.

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1. Building Spacing

Buildings should be spaced at least 60 feet apart (minimum 30-foot setback) to minimize risk of exposure to an adjacent structural fire and the conflagration potential of the spread of fire from structure to structure. The 30-foot set back will also allow compliance with Section 4291 Public Resources Code (30-foot clearance requirement).

Because close spacing is common in mobile home parks, those situated in wildland fire hazardous areas are particularly susceptible to destruction or serious damage from conflagrations. Spacing between mobile homes in such parks should be no less than that required between buildings in a similar fire hazard classification zone.

10 foot setback from property line unable to meet 30' clearance requirement



30 foot setback from adjacent property line



2. Building Density

Building densities, as determined by minimum buildable lot area and spacing between structures, should be approximately three dwellings per acre for slopes from 15 to 30 percent. For slopes from 31 to 50 percent, densities should be limited to one unit for every three to five acres. Higher standards should be imposed or structural development should be prohibited where local conditions (the slope is over 50 percent, canyon mouths, ridge saddles) create critical fire hazards. Buildings and structures moved into any hazardous fire area should comply with the spacing requirements of this section.

Increase in Spacing Requirements

The local fire authority may increase spacing requirements as set forth above on the basis of hazard severity classification and any other local conditions which would increase the potential of fire spreading from one structure to another.

Hills and slopes require maximum setback and spacing



Level terrain allows closer building sites

Reduction in Spacing Requirements

Reductions in the spacing requirements may be permitted relative to and in accordance with the following conditions: (1) availability of properly built access roads; (2) availability of an adequate water supply; (3) the use of materials and construction of more fire resistive than required; (4) strict adherence to clearance requirements; and (5) construction and maintenance of greenbelts and fuelbreaks.

Such reductions in spacing could be cumulative but in no case should such spacing be less than that specified in the current Uniform Building Code. The responsible fire protection agency should review any reduced requirements.

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Vegetation Clearance

Brush and dense undergrowth in forest areas are a primary hazard to structures. Brush and dense undergrowth ignite readily, burn with intense heat, and spread fire rapidly. Vegetation clearance requirements are necessary to reduce structural exposure to flames and radiant heat and to give residents and firefighters a reasonable chance of protecting structures.

California Public Resources Code (PRC) Section 4291 requires certain minimum clearance and states as follows: "Any person who owns, leases, controls, operates, or maintains any building or structure in, upon, or adjoining any mountainous area or forest-, brush-, or grass-covered lands or land covered with flammable material shall at all times do all of the following:

1. Firebreaks – 30 feet

Maintain around and adjacent to such building or structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side thereof or to the property line, whichever is nearer, all flammable vegetation or other combustible growth. This subsection does not apply to single specimens of trees, ornamental shrubbery, or other plants which are used as ground cover, provided that they do not form a means of rapidly transmitting fire from the native growth to any building or structure.

Firebreak around structure



2. Fuel Modification – 30 feet to 100 feet

Maintain around and adjacent to any such building or structure additional fire protection or firebreak made by removing all brush, flammable vegetation, or combustible growth which is located 30 feet



Fuel modification up to 100 feet

to 100 feet from such building or structure or to the property line, whichever is nearer, as may be required by the Director of Forestry when he finds that because of extra hazardous conditions, a firebreak of only 30 feet around such building or structure is not sufficient to provide reasonable fire safety. Grass and other vegetation located more than 30 feet from such building or structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion.

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3. Chimney and Stovepipes

Remove that portion of any tree which extends within 10 feet of the outlet of any chimney or stovepipe.

4. Overhanging Vegetation

Remove dead or dying wood from any tree adjacent to or overhanging any building.



Remove vegetation



Chimney clearance



Remove accumulated roof debri

5. Accumulated Roof Debris

Remove leaves, needles, or other dead vegetative growth from the roof of any structure.

6. Local Ordinance Adoption

In addition to the above, provisions of PRC Section 4291, the following is also recommended and will need local ordinance adoption.

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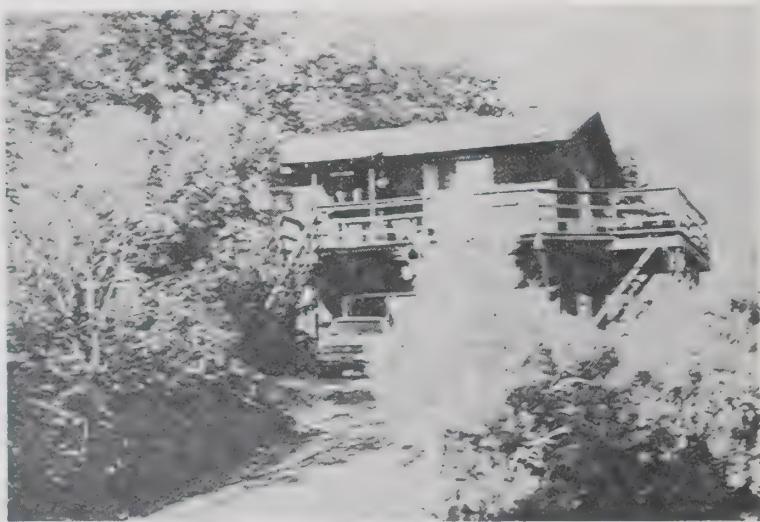
a. Lot Size and Placement of Buildings

Lot size and placement of buildings thereon should be such that adequate clearance of hazardous flammable vegetative cover may be performed within the limits of the owner's lot. Structures should not be built within 30 feet of the property line.

b. Adjacent Landowner Responsibility

Requirements to maintain effective vegetative clearance around structures in a fire hazardous area shall apply to both persons owning or controlling such structures and to persons owning or controlling any land adjacent to such structures.

Good planning and building clearance protects structure from encroaching wildfire and gives firefighters a chance



c. Compliance for Clearing Vegetation

Should these owners fail to effect the required vegetation clearance following proper notice, the governing authority may cause the clearing to be done and make the expense a lien against the property upon which the work was accomplished.

Fuelbreaks and Greenbelts

Fuelbreaks or greenbelts separating communities, and clusters or groups of structures from the native vegetation are recommended. Fuelbreaks and greenbelts will be located to protect both developing areas and adjacent wildlands. The most advantageous location and design must be determined separately for each case, in consideration of fuels, topography, weather, exposures, and other constructed or planned improvements.

1. Plans

Plans should be developed cooperatively with and reviewed by the responsible fire authority. Fire authority review and approval should be a part of the permit-granting process.

2. Design and Construction

Design and construction should include consideration of environmental and visual impacts and construction and maintenance costs versus risks.

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3. Access

Fuelbreaks and greenbelts should be coordinated with water systems, fire roads, and other routes of access and shall provide maximum traffic circulation to meet fire protection needs consistent with topography. Access to a publicly maintained road adequate for fire, flood or other emergencies should be provided at intervals of not more than one-half mile.

4. Open Space

Maximum advantage should be taken of planned or existing parks, golf courses, and other open space such as utility easements where low volume, less hazardous fuel conditions are maintained.

Planned open space



5. Primary Fuelbreaks

Primary fuelbreaks and greenbelts may be constructed around the development perimeter, on principal ridges separating major drainage areas, at the base of primary ridges, and in wide canyons, as needed. Primary fuelbreaks should have a minimum width of 300 feet.



Greenbelt constructed around development perimeter

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6. Secondary Fuelbreaks

Secondary fuelbreaks and greenbelts should be located on spur ridges, in secondary canyons, and elsewhere as needed. Secondary fuelbreaks should have a minimum width of at least 200 feet. Greater or less width may be required depending on the precise location of the fuelbreak and the judgment of the responsible fire authority.

Provision for continued adequate maintenance should be included in development plans as a requirement for permit approval.

Section of secondary fuelbreak based on judgement of responsible fire authority



Maintenance funds could be provided by a Homeowner's Association assessment fee, or by any other means that is approved by the local resident. The continued need versus benefit should be reviewed periodically by the responsible fire agency and government body, and when appropriate, the fire defense improvement needs could be reduced or eliminated.

Cost-Effective Benefits

The reduction of disastrous losses of life, property and resources in California can only be accomplished if state and local government planners, developers and fire agencies work in harmony to obtain and enforce reasonable fire safe standards. Government must be cost effective. It is important that planners include fire protection measures as part of the land-use planning process. The public can benefit from the advantages of a fire safe program. The lack of such practices not only exposes life and property to increased risk of destruction by wildfire, increases insurance rates, but makes the task of firefighting more difficult and costly. A reasonable approach to accomplishing the mandates of protecting life, property and natural resources from wildfire is through the application of a workable fire protection program throughout the State of California.

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AUTHORITIES

Following California's disastrous conflagration rural and wildland fires during the Fall of 1970, the Resources Agency Secretary asked the Director of the Department of Conservation to form a task force to define California's wildfire problem and to recommend *legislative* or *administrative* actions that should be taken to solve the problem. The *Task Force's report*, "*Recommendations to Solve California's Wildland Fire Problem*," published in June 1972, addressed the whole gamut of fire protection problems in California and cited Needs, Recommendations to meet those Needs, and Methods of Implementing the Recommendations.

The Task Force's Report was based on the findings of subcommittees formed under five broad categories: (1) Fire Prevention; (2) Fuel Management and Hazard Reduction; (3) Zoning, Subdivision Codes and Land Use; (4) Building Codes and Construction Material Requirements; and (5) Fire Control. Following the release of the Report, ad hoc action committees for each of the five categories were formed to oversee and direct implementation of the recommendations.

The Task Force represented a substantial interagency and private sector effort toward solving California's wildland fire problem. Representatives of more than 31 state, county, and private organizations were involved. Recommendations for improved fire safety, guidelines were included in one form or another in several of the Task Force's recommendations.

Planning and Land Use legislation enacted in 1970 and 1971 and succeeding years provides additional emphasis toward the implementation of adequate fire safety for wildland occupants but require concerted effort by local government in the form of ordinances and necessary enforcement.

Timber harvesting operations are regulated by many sections of Title 14 of the California Administrative Code (CAC). These sections, in part, require the filing of a fire prevention and control plan for the timber harvest area. The regulations also provide for treatment of snags, logging slash, and other debris in order to reduce the fire and safety hazards in the logging area along roads and around structures currently maintained for human habitation.

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STATE OF CALIFORNIA

Public Resources Code

Section 21000, the California Environmental Quality Act of 1970, requires governmental agencies at all levels to develop standards and procedures necessary to protect environmental quality. Proposed projects having a "significant effect on the environment" shall include appropriate mitigating measures.

In addition to the statutory or local requirements, the Uniform Building Code and the Uniform Fire Code are valuable tools for the drafting of state regulations and local fire protection ordinances.

BUSINESS AND PROFESSIONS CODE

Section 11025 provides that the Real Estate Commissioner shall not issue a public report on any land project unless the offsite measures are adequate to prevent damage to property by reason of natural occurrences which are usual or predictable for the area. (It is presumed by the writer that hazard reduction measures should be taken to ensure safety from wildfire.)



GOVERNMENT CODE

Section 12038 enables various state agencies to provide technical assistance to local governments upon request.

Section 65302(a) requires local governments to include in the Land Use Element of their General Plan regulations and conditions in regard to the location of housing and a statement of the standards of building density recommended for various districts.

Section 65302(i) provides that the General Plan must include a Safety Element for the protection of communities from fires including features necessary for such protection as evacuation routes, peak load water supply requirements, minimum road widths, and clearances around structures.

Section 65303 provides that a Circulation Element shall be a part of the General Plan including the naming of streets and the numbering of houses.

Section 65451 provides that specific plans for subdivision shall include standards for the protection of watershed areas and the conservation of natural resources, including forests, vegetation, and soil. This section also provides that specific plans shall include regulations and conditions necessary for "the location of areas such as flood plains or excessively steep or unstable terrain where no building will be permitted in the absence of adequate precautionary measures being taken to reduce the level of risk to that comparable with adjoining and surrounding areas." Specific development plans shall include standards for population density and building density, lot size, type of construction, water supply, and the protection of watershed areas.

Section 65560 provides for open space zoning to also include identification of high fire-risk area.

Section 66418 defines "design" as referring to street alignment, grades and widths, among other features.

Section 66411 states that when local ordinances provides, the governing body may require the improvement of public or private streets or easements as may be necessary for local traffic. This presumably could include fire apparatus.

Section 66424 enables local governments to regulate the division of land which is in a subdivision in regard to the dedication of right-of-way easements and the construction of reasonable offsite and onsite improvements. (*Regulates lot splitting.*)

Section 66474 provides that a governing body shall deny approval of a subdivision map if the site is not physically suitable for the type of development.

Section 66455.5 provides for local government bodies to submit tentative subdivision maps (mandatory submittal in the case of land projects) through the California Office of Intergovernmental Management to appropriate state agencies for evaluation of the environmental impact of the proposed subdivision.

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GLOSSARY

Acceptable Level of Risk: The level of loss, injury or destruction below which no specific action by local government is deemed necessary other than making the risk known.

Conflagration: A large and destructive fire, usually aggravated by strong winds which carry firebrands over natural or manmade barriers.

Defensible Space: An area either either natural or manmade where material capable of causing a fire to spread unchecked has been treated, cleared, reduced or changed in order to act as barrier between the advancing wildfire and the loss to life, property or resources.

Fuelbreak: An area, usually a long strip strategically located, wherein vegetative fuels are reduced in volume and maintained so as to produce a reduction of fire intensity if a wildfire burns into it.

Greenbelt: An irrigated, landscaped and regularly maintained fuelbreak, usually put to some additional use (e.g., golf course, park playground).

Mediterranean Climate: A relatively mild weather pattern characterized by winter precipitation and long, hot and dry summers.

Planned Unit Development: A real estate development, usually of large scale, which is planned and developed as a complete community, including residential, commercial, recreational and school facilities as a minimum.

Prescribed Fire: Fire used for land management purposes which is conducted under previously prescribed conditions of temperature, humidity, fuel moisture, wind speed and direction to achieve a specific purpose, e.g., fire hazard reduction, site preparation for planting, control of certain unwanted plants, plant disease control.

Rural: Any area wherein the residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops.

Urban: In this report refers to any area wherein the residences and other works of man form an essentially solid covering of the landscape, including most areas within cities and towns, subdivisions, commercial and industrial parks, and similar developments whether inside city limits or not.

Urban/Wildland Interface: That line, area or zone where structures and other human development meets or intermingles with undeveloped wildland or vegetative fuels.

Wildfire: An uncontrolled fire, usually spreading through vegetative fuels but often consuming structures as well.

Wildland: An area in which development is essentially non-existent, except for roads, railroads, power-lines and similar transportation facilities. Structures, if any, are widely scattered and are primarily for recreation purposes. Includes large cattle ranches and forests managed for timber production.

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APPENDIX D



Uniform Fire Codes “Appendix II A”

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UNIFORM FIRE CODE™

1988 Edition



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APPENDIX II-A

Division II
ENVIRONMENTAL HAZARD CONTROLS

APPENDIX II-A
SUPPRESSION AND CONTROL OF HAZARDOUS
FIRE AREAS

1. INTENT

The unrestricted use of grass, grain, brush or forest-covered land in hazardous fire areas is a potential menace to life and property from fire and resulting erosion. It is therefore the intent of this appendix to provide necessary safeguards to prevent the occurrence of fires and to provide adequate fire-protection facilities to control the spread of fire which might be caused by recreational, residential, commercial, industrial or other activities conducted in any hazardous fire area.

2. DEFINITIONS

- (a) Unless otherwise expressly stated within this code, the following terms shall, for the purposes of this article, have the meanings indicated by this section.
- (b) **TRACER** shall mean any bullet or projectile incorporating a feature which marks or traces the flight of said bullet or projectile by flame, smoke or any other means which results in fire or heat.
- (c) **TRACER CHARGE** shall mean any bullet or projectile incorporating a feature designed to create a visible or audible effect by means which result in fire or heat and shall include any incendiary bullet or projectile.

3. AUTHORITY TO STIPULATE PERMIT CONDITIONS

The chief shall have the authority required by this appendix to stipulate conditions as he deems necessary in all permits. If in his judgment public safety would be better served, he may refuse to issue any such permit.

4. RESTRICTED ENTRY

The chief shall officially determine and publicly announce when any hazardous fire area shall be closed to entry and when such area shall again be opened to entry. No person other than those hereinafter expressly exempted shall go on or be upon any hazardous fire area, except public roadways, inhabited areas or established trails and camp sites which have not been closed during such time when the hazardous fire area is closed to entry. It is not the intention of this section to prohibit residents or owners of private property within any hazardous fire area or their invitees or guests from going or being upon their lands, and such persons are to such extent excepted from the provisions of this section. This section does not apply to any entry, in the course of duty, by any peace or police officer, or any other duly authorized public officer, member of any fire department or member of the United States Forest Service.

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5. TRESPASSING ON POSTED PROPERTY PROHIBITED

(a) Whenever the chief determines that any specific area within a hazardous fire area presents an exceptional and continuing fire danger because of the density of natural growth, difficulty of terrain, proximity to structures or accessibility to the public, he shall declare such area closed until changed conditions warrant termination of closure. The chief shall order any such area posted as hereinafter provided.

(b) Approved signs prohibiting entry by unauthorized persons and referring to this appendix shall be placed on every area ordered posted by the chief pursuant to Section 5 (a) above.

(c) No person shall enter or remain within any area closed and posted by the chief pursuant to Section 5 (a) and (b) above, provided that the following persons shall be exempted from the provisions of this section: owners or occupiers of private or public property within closed and posted areas, their guests or invitees; local, state or federal public officers or their authorized agents acting in the course of duty.

6. SMOKING PROHIBITED

No person shall light, ignite or otherwise set fire to or smoke any tobacco, cigarette, pipe or cigar in any hazardous fire area, provided, however, that nothing in this section shall apply to any place of habitation or within the boundaries of any established smoking area or campsite as designated by the chief.

7. SPARK ARRESTERS REQUIRED

Each chimney used in conjunction with any fireplace, barbecue, incinerator or any heating appliance in which solid or liquid fuel is used, upon any building, structure or premises located within 200 feet of any hazardous fire area, shall be maintained with a spark arrester constructed with heavy wire mesh or other noncombustible material with openings not to exceed 1/2 inch.

8. TRACER BULLETS, TRACER CHARGES, ROCKETS AND MODEL AIRCRAFT PROHIBITED

(a) No person shall fire or cause to be fired any tracer bullet or tracer charge into or across any hazardous fire area, nor shall he have in his possession any tracer bullet or tracer charge on such area.

(b) No person shall use, fire or project into or across any hazardous fire area any rocket, model plane, glider or balloon powered with an engine, propellant or other feature liable to start or cause fire in said area.

9. EXPLOSIVES AND BLASTING

No person shall possess, keep, store, sell, offer for sale, give away, use, discharge, transport or dispose of in any manner any explosives within any hazardous fire area except by the authority of a written permit from the chief.

10. FIREWORKS PROHIBITED

(a) No person shall use or possess fireworks in a hazardous fire area.

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(b) The chief shall seize, take, remove or cause to be removed all fireworks in violation of this section.

11. APIARIES

No person shall use any lighted or smoldering material in connection with smoking bees in or upon any hazardous fire area except by the authority of a written permit from the chief.

12. OPEN-FLAME DEVICES

(a) No person shall operate or use any device, machine, or process such as a welding torch, tar pot, decorative torch or any other device liable to start or cause fire in or upon any hazardous fire area, except by the authority of a written permit from the chief, provided, however, that no permit will be required if such use is within habited premises or designated campsites and such uses are a minimum of 30 feet from any grass, grain, brush- or forest-covered areas.

(b) No person shall operate or use any flame-employing device such as a lantern or kerosene road flare as a signal or marker in or upon any hazardous fire area. This section shall not apply to or restrict the proper use of fusees at the scenes of emergencies or as required by standard railroad operating procedures.

13. OUTDOOR FIRES

(a) No person shall build, ignite or maintain any outdoor fire of any kind or character, or for any purpose whatsoever, in or upon any hazardous fire area, except by the authority of a written permit from the chief. No permit will be required for outdoor fires within habited premises or designated campsites where such fires are built in a permanent barbecue, portable barbecue, outdoor fireplace, incinerator or grill and are a minimum of 30 feet from any grass, grain, brush- or forest-covered area. Such a permit shall incorporate such terms and conditions which will reasonably safeguard public safety and property. Regardless of permit, however, no person shall build, ignite or maintain any outdoor fire in or upon any hazardous fire area under the following conditions:

1. When any high wind is blowing; or
2. When there is no person aged 17 or over present at all times to watch and capable of tending such fire; or
3. Such times as public announcement is made that there shall be no open burning.

(b) No person shall use any permanent barbecue, portable barbecue, outdoor fireplace or grill for the disposal of rubbish, trash or combustible waste material.

14. INCINERATORS AND FIREPLACES

(a) No person shall build, install or maintain any incinerator, outdoor fireplace, permanent barbecue or grill in any hazardous fire area without first securing written approval of the chief.

(b) Every incinerator, outdoor fireplace, permanent barbecue or grill shall be maintained in good repair and in a safe condition at all times. All openings in any such appliance shall be provided with an approved spark arrester, screen or door.

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If required for their proper functioning, barbecues and grills may be approved with certain openings left unprotected.

15. CLEARANCE OF BRUSH OR VEGETATIVE GROWTH FROM ELECTRICAL TRANSMISSION LINES

(a) **Support Clearance.** Any person owning, controlling, operating or maintaining any electrical transmission line upon any hazardous fire area shall, at all times, maintain around and adjacent to any pole supporting a switch, fuse, transformer, lightning arrester, line junction, dead end, corner pole, towers or other poles or towers at which power company employees are likely to work most frequently, an effective firebreak consisting of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower, provided, however, that this provision shall not be deemed to apply to lines used exclusively as telephone, telegraph, telephone or telegraph messenger call, fire or alarm lines or other lines classed as communication circuits by a public utility

(b) **High Tension Line Clearance.** Any person owning, controlling, operating or maintaining any electrical transmission line upon any hazardous fire area shall maintain a clearance of the respective distances as specified in this section in all directions between all vegetation and all conductors carrying electrical current:

1. For lines operating at 2,400 volts and less than 68,000 volts, 4 feet;
2. For lines operating at 68,000 volts and less than 110,000 volts, 6 feet;
3. For lines operating at 110,000 volts and over, 10 feet.

In any case, such distance shall be sufficiently great to furnish the required clearance from the particular wire or conductor to any position of such wire or conductor at any temperature of 120°F. or less. Forked trees, dead trees, old decadent or rotten trees, those weakened by catfaces, decay or disease and trees leaning toward the line, which may contact the line from the side or may fall on the line, shall be felled, cut or trimmed so as to remove the hazard.

(c) **Self-supporting Aerial Cable.** No clearing to obtain line clearance is required when self-supporting aerial cable is used except that forked trees, leaning trees and other growth which may fall across the cable and break it shall be removed.

(d) **Exceptions.** Nothing contained in this section shall be construed to require any person to maintain any clearing on land where such person does not have the legal right to maintain such clearing, nor shall any provision of this appendix be construed to require any person to enter upon or to damage property of another without consent of the owner thereof.

16. CLEARANCE OF BRUSH OR VEGETATIVE GROWTH FROM STRUCTURES

(a) Any person owning, leasing, controlling, operating or maintaining any building or structure in, upon or adjoining any hazardous fire area, and any person owning, leasing or controlling any land adjacent to such buildings or structures, shall at all times:

1. Maintain around and adjacent to such building or structure an effective firebreak made by removing and clearing away, for a distance therefrom of

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not less than 30 feet on each side thereof, all flammable vegetation or other combustible growth. This section shall not apply to single specimens of trees, ornamental shrubbery or similar plants used as ground covers, provided that they do not form a means of rapidly transmitting fire from the native growth to any structure.

2. Maintain around and adjacent to any such building or structure additional fire protection or firebreak made by removing all brush, flammable vegetation or combustible growth located from 30 feet to 100 feet from such building or structure as may be required by the chief when he finds that because of extrahazardous conditions a firebreak of only 30 feet around such structure is not sufficient to provide reasonable firesafety. Grass and other vegetation located more than 30 feet from such building or structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion.
3. Remove that portion of any tree which extends within 10 feet of the outlet of any chimney.
4. Maintain any tree adjacent to or overhanging any building free of dead-wood.
5. Maintain the roof of any structure free of leaves, needles or other dead vegetative growth.

(b) In the event that any of the conditions prohibited by Subsection (a) of this section exist, the executive body may instruct the chief to give notice to the owner of the property upon which such condition exists to correct such prohibited condition, and if the owner fails to correct such condition the executive body may cause the same to be done and make the expense of such correction a lien upon the property upon which such condition exists.

17. CLEARANCE OF BRUSH OR VEGETATIVE GROWTH FROM ROADWAYS

(a) The chief may remove and clear within 10 feet on each side of every roadway all flammable vegetation or other combustible growth and may enter upon private property to do so. This section shall not apply to single specimens of trees, ornamental shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground covers, provided that they do not form a means of readily transmitting fire. As used in this section, "roadway" means that portion of a highway or private street improved, designed or ordinarily used for vehicular travel.

(b) If the chief determines in any specific case that difficult terrain, danger of erosion or other unusual circumstances make strict compliance with the clearance of vegetation provisions of Sections 15, 16 or 17 of this appendix undesirable or impractical, he may suspend enforcement thereof and require reasonable alternative measures designed to advance the purposes of this article.

18. ILLEGAL DUMPING

No person shall place, deposit or dump any garbage, cans, bottles, papers, ashes, refuse, trash, rubbish or combustible waste material in or upon any

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hazardous fire area. No person shall dump such material in, upon or along any trail, roadway or highway in any hazardous fire area. Public and private dumping areas having been approved by the chief shall be deemed to be in compliance with this section.

19. DISPOSAL OF ASHES

No person shall place, deposit or dump any ashes or coals in or upon any hazardous fire area except: in the hearth of an established fire pit, camp stove or fireplace; or in a noncombustible container with a tight-fitting lid, which is kept or maintained in a safe location not less than 10 feet from any combustible vegetation or structure; or where such ashes or coals are buried and covered with 1 foot of mineral earth not less than 25 feet from any combustible vegetation or structure.

20. ILLEGAL USE OF FIRE ROADS AND FIREBREAKS

(a) No person, except public officers acting within the scope of their duties, shall travel upon or drive or park any motorcycle, motor scooter or motor vehicle upon any fire road or firebreak beyond the point where travel is restricted by a cable, gate or sign without the permission of the property owner or owners involved. No person shall park any vehicle so as to obstruct the entrance to any fire road or firebreak.

(b) No person shall install or maintain a radio or television aerial, or guy wires thereto, or any other obstruction on any fire road or firebreak, which is less than 16 feet above such fire road or firebreak.

21. USE OF MOTORCYCLES, MOTOR SCOOTERS AND MOTOR VEHICLES

No person shall operate any motorcycle, motor scooter or motor vehicle, except upon clearly established public or private roads within any hazardous fire area without first having secured a permit to do so from the chief. No such permit shall be issued unless written permission from the property owner is first presented.

22. TAMPERING WITH FIRE DEPARTMENT LOCKS, BARRICADES, SIGNS

(a) No person shall tamper with, mutilate, destroy or remove any lock, barricade, seal, cable, sign or marker installed within any hazardous fire area by or under the control of the chief or other duly constituted authority.

(b) No unauthorized person shall unlock any gate, door, barrier or lock installed by or under the control of the chief or other duly constituted authority.

23. LIABILITY FOR DAMAGE

The expenses of fighting any fires which are the result of a violation of this appendix are a charge against the person whose violation of this appendix caused the fire. Damages caused by such fires shall constitute a debt of such person and are collectable by the chief in the same manner as in the case of an obligation under a contract, expressed or implied.

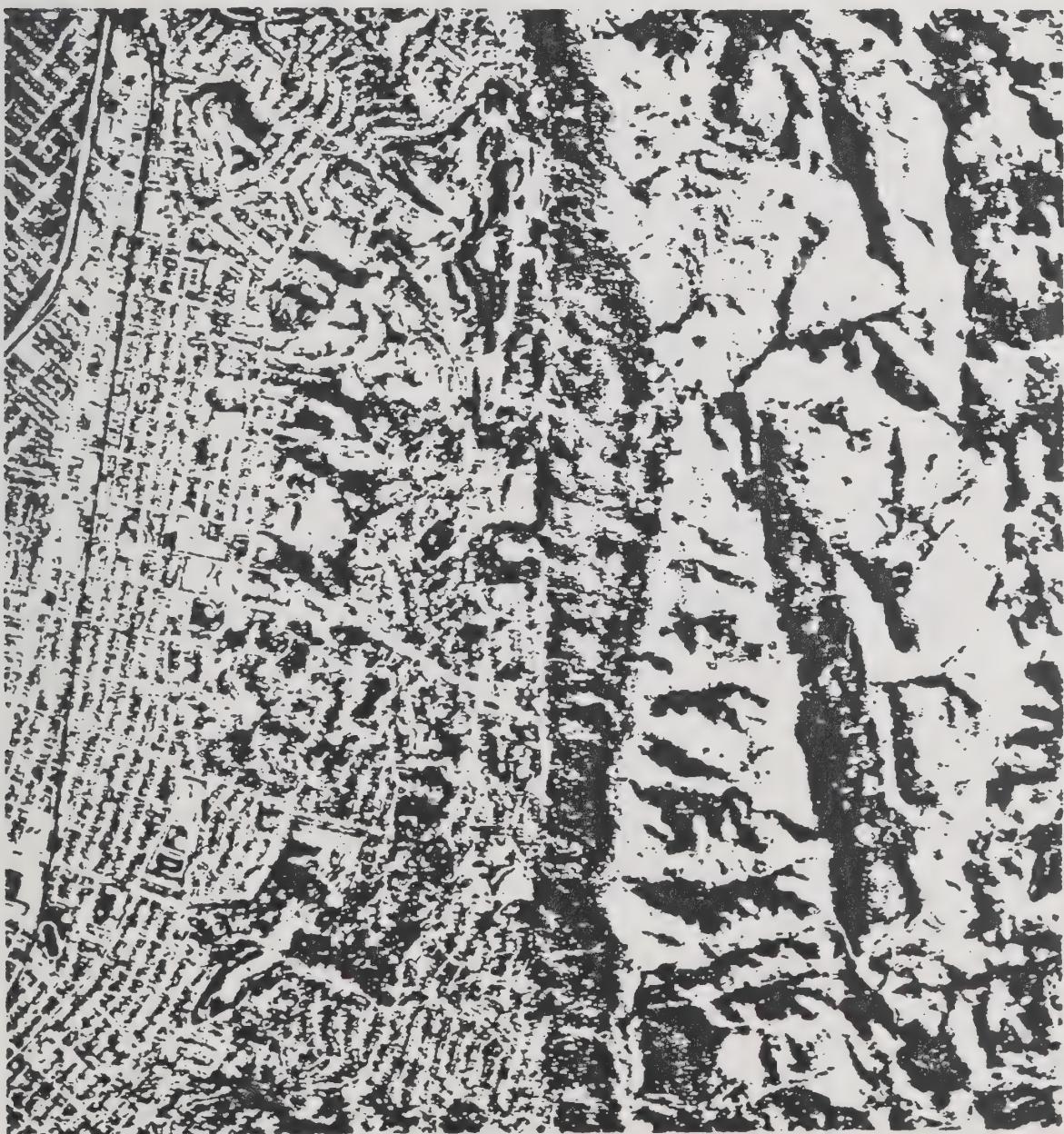
APPENDIX E

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**1982 Report Of The Blue Ribbon Urban Interface
Fire Prevention Committee**

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**1982 REPORT OF THE
BLUE RIBBON URBAN INTERFACE
FIRE PREVENTION COMMITTEE**



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EAST BAY REGIONAL PARK DISTRICT

RESOLUTION 1982-2-44

February 2, 1982

ADOPTION OF THE REPORT OF THE BLUE RIBBON FIRE PREVENTION COMMITTEE AND AUTHORIZATION TO PROCEED WITH THE ESTABLISHMENT OF A JOINT POWERS AGENCY

WHEREAS, in May, 1981, the Board of Directors of the East Bay Regional Park District appointed a special Blue Ribbon Committee to study the potential fire hazard existing along the twenty-five mile boundary area between the north end of Wildcat Canyon Regional Park in Richmond and the south end of Anthony Chabot Regional Park in Oakland; and

WHEREAS, the Blue Ribbon Committee was composed of area residents, environmentalists, fire behavior and natural resource specialists, representatives from the East Bay Municipal Utility District, the University of California, Berkeley Campus, fire officers from the Cities of Berkeley, El Cerrito, Kensington (Contra Costa County), Oakland and Richmond, the California Department of Forestry as well as East Bay Regional Park District staff, and was chaired by William Penn Mott, Jr. and

WHEREAS, the charge of the Blue Ribbon Committee was the development of a comprehensive fire prevention program for the urban-wildland interface areas bordering Wildcat Canyon, Tilden, Redwood and Anthony Chabot Regional Parks; and

WHEREAS, the Blue Ribbon Committee meeting over a seven month period thoroughly reviewed all aspects of the urban-wildland interface zone fire problem including existing housing patterns, vegetation, debris and slopes, heat, moisture and wind factors, environmental and legal considerations; and

WHEREAS, the Committee focused first on public agency efforts to reduce the immediate urban-wildland interface zone fire risk, at the same time placing a strong emphasis on public information to educate and motivate area residents to do their part to minimize the fire danger; and

WHEREAS, after thorough review of all aspects of the existing fire hazard situation, the Committee unanimously concurred in recommending a fuelbreak along the urban-wildland interface zone as the most effective means of reducing the risk of fire spread within the area; and

WHEREAS, the Committee also endorsed the establishment of a Joint Powers Agency representing the Cities of Berkeley, El Cerrito, Kensington (Contra Costa County), Oakland and Richmond, the University of California, Berkeley Campus, the East Bay Municipal Utility District and the East Bay Regional Park District, which would work towards the establishment of a special assessment to fund fuelbreak construction and maintenance, review environmental considerations relative to fuelbreak construction and monitor the progress of the fuelbreak program.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the East Bay Regional Park District gratefully thank the members of the Blue Ribbon Committee for their conscientious and dedicated efforts and commend them for preparing a comprehensive report and implementation plan; and

BE IT FURTHER RESOLVED that the Board of Directors of the East Bay Regional Park District does hereby unanimously adopt the final report of the Blue Ribbon Committee and directs staff to proceed with the establishment of a Joint Powers Agency to spearhead the construction of the fuelbreak along the urban-wildland interface zone.

Moved by Director Costa, seconded by Director Radka, and approved this 2nd day of February, 1982, by the following vote:

FOR: Directors Howard L. Cogswell, Walter H. Costa, William F. Jardin, Mary Lee Jeffords, Harlan Kessel and Ted Rake

AGAINST: Directors none

ABSENT: Director John J. Leavitt

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BLUE RIBBON FIRE PREVENTION COMMITTEE

MEMBERSHIP

William Penn Mott, Chairman, Fire Prevention Committee

Gerta Barlow, Park Neighbor, Berkeley

Andrew Benson, Remote Sensing, University of California, Berkeley

Bill Breuner, Soil Conservation Service, Concord

Richard Brown, City Manager, El Cerrito -

Nye Butler, Chief, El Cerrito Fire Dept, El Cerrito

Floyd Cormier, Deputy Chief, Richmond Fire Department, Richmond

Dr. Harry Greene, Museum of Vertebrate Zoology, University of California, Berkeley

Howard James, Bay Area Air Quality Management District, San Francisco

Rich Johnson, University of California, Berkeley

Dr. William Lidicker, Museum of Vertebrate Zoology, Universtiy of California, Berkeley

Donald Markert, Chief, Kensington Fire District, Kensington

Don Mathews, Assistant Chief, Oakland Fire Dept., Oakland

Dr. Joe McBride, Department of Forestry, University of California, Berkeley

Bob Nuzum, Land Manager, East Bay Municipal Utility District, Oakland

Greg Pisano, California Department of Forestry, Pleasanton

Victor Porter, Chief, Berkeley Fire Dept., Berkeley

Kay Quong, City Manager's Office, City of Oakland

Bob Robeson, California Department of Forestry, Morgan Hill

Dr. Wil Siri, Park Neighbor, El Cerrito

Dr. Ronald Wakimoto, Department of Forestry, University of California, Berkeley

Dr. Joseph B. Zicherman, Fire Test Facility, University of California, Berkeley

East Bay Regional Park District Staff:

Jerry Kent, Assistant General Manager

Rich Aronson, Fire Chief

Steve Abbors, Supervisor, Tilden Nature Area

Roger Wilde, Resource Analyst

Rosemary Cameron, Administrative Assistant

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EXECUTIVE SUMMARY

In May, 1981, the Board of Directors of the East Bay Regional Park District, at the request of Mayor Margaret Collins of El Cerrito, appointed a special blue ribbon panel to study the fire danger in the East Bay hills between natural lands and the urbanized residential areas. Review of existing housing patterns and vegetation, as well as heat, moisture and wind factors indicated that the most serious fire hazard existed along the twenty-five mile boundary area between the north end of Wildcat Canyon Regional Park in Richmond and the south end of Anthony Chabot Regional Park in Oakland.

While the bulk of the open space land in this area is in the Park District ownership, the East Bay Municipal Utility District, University of California, and a number of city and private land owners also have property within the interface zone. The area in the East Bay hills where homes have been built up to the ridge tops directly abutting large wooded open space lands, have been included in the urban-wildland interface zone and studied in depth by the Blue Ribbon Committee.

Appointed to serve on this committee were area residents, environmentalists, fire behavior and natural resource specialists, representatives from the East Bay Municipal Utility District and the University of California as well as representatives from each of the involved fire agencies. This committee, which was chaired by former State Department of Parks and Recreation Director, William Penn Mott, Jr., was charged with the development of a comprehensive fire prevention program for the urban-wildland interface areas bordering Wildcat Canyon, Tilden, Redwood and Anthony Chabot Regional Parks. The section between Tilden and Redwood Regional Parks was not included in the committee's charges because of complex property ownerships and the absence of continuous large areas of publicly owned land.

The risk of fire in the East Bay urban-wildland interface zone is greatest during the warm dry months of the May to October fire season. It is during this period that warm dry winds out of the north or north-east are more frequent, creating a situation conducive to rapidly moving, high intensity fires. The open space portion of this area consists largely of steep (20%-60%) east and north facing slopes which are predominantly covered by brush and areas of eucalyptus stands. Over the years there has been significant buildup of dead or nearly dead brush which will burn rapidly during the high fire danger period. In the eucalyptus stands there has been accumulation of dry, dead leaves and bark which also poses a significant fire hazard. Following the 1972 eucalyptus freeze, some seven miles of fuelbreak was constructed through these stands, however, maintenance has been minimal during the intervening years allowing for the fuel buildup.

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On the urbanized side of the interface zone, many of the homes which have been built along the crest of the west facing slopes have shake and shingle roofs and are surrounded by brushy vegetation which has been allowed, in many cases, to grow up to the homes and under decks. Where clearing around homes occurs, it is rarely the thirty feet minimum clearance required by State law, and even more rarely, the hundred foot clearance which should be maintained in fire risk hillside area. Additionally, many of the streets in the area are narrow and winding, hampering access for fire apparatus and escape routes for residents.

When the Blue Ribbon Committee began its work in June, 1981, it focused first on the special efforts taken by the public agencies operating in the interface zone to reduce the immediate risk of fire in the area. Recognizing that homeowners play a key role in fire protection and prevention, the Committee also placed a strong emphasis on public information to educate and motivate area residents to do their part. To that end, Committee members drafted a brochure outlining homeowner fire prevention practices which will be printed and distributed to all residents of the interface zone during the spring of 1982.

After thorough review of all aspects of the existing fire hazard situation, the Committee unanimously concurred with the recommendation of Wild Fire Management Specialist, Dr. Ronald H. Wakimoto, that a fuelbreak running along the urban-wildland interface zone was the most effective means of reducing the risk of fire spread within the area. Fuelbreaks are areas of natural vegetation which are selectively thinned and maintained for their low fire spread characteristics. Except for relatively fire resistant species such as native Redwoods, Oaks, Bays and North Coastal scrub, all other woody fuel would be thinned and pruned so that fuel would not be continuous within the fuelbreak. All trees and shrubs, including natives would be pruned sufficiently high to prevent their ignition by burning ground fuels. The fuelbreak should have low growing ground cover to prevent erosion and to cut down on the heat output and slow fire spread. The fuelbreak would provide an area where, in the event of a fire, firefighting crews could quickly and safely establish firelines. The fuelbreak, when used in this fashion, helps to control fires under burning conditions that now hinder control in unbroken fuels on steep terrain.

The Blue Ribbon Committee considered very carefully existing conditions and vegetation along the entire 25.5 mile length of the urban-wildland interface zone and classified the area into the following three situations:

A. Existing Fuelbreak - 13.8 miles in length

1. Existing Fuelbreak on EBRPD lands - 9.7 miles
2. Existing Fuelbreak on EBMUD lands - 1.2 miles
3. Existing Fuelbreak on U.C. Berkeley lands - 1.2 miles
4. Existing Fuelbreak on City of Oakland lands - 1.7 miles

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B. Area of Low Fire Hazard - 4.9 miles in length

C. Area of Proposed New Fuelbreak Construction - 6.8 miles in length

Specifically, the Committee recommends that the entire 13.8 miles of existing fuelbreak be properly maintained to remove excessive combustible materials and eliminate eucalyptus sucker regrowth by each of the responsible public agencies. It has been estimated that the current cost per mile for rehabilitation of the 300 foot wide fuelbreak is approximately \$30,000 per mile. This seemingly high cost per mile results from the fact that fuelbreak rehabilitation must be accomplished by supervised hand crews rather than by less expensive mechanical means or prescribed burning.

The Committee also endorsed the recommendation contained in the Action Plan that an additional 6.8 miles of new fuelbreak be constructed. This new fuelbreak would involve both public agencies and private property owners. Private property owners would be required to comply with existing State law for maintaining clearance for their structures with public agencies accomplishing additional clearance through formation of a Joint Powers Agency for planning purposes and a Special Assessment District for funding purposes. The report contains specific recommendations for determining the width of the new fuelbreak based upon the slope and the height and type of vegetation in a given area. Estimates for new fuelbreak construction show costs to be approximately \$5,000 per mile if mechanical clearing is possible, and up to \$15,000 to \$20,000 per mile if hand labor is required.

There are, of course, ongoing costs for the necessary regular maintenance of the completed fuelbreak. On public lands, it is anticipated that once the fuelbreak areas are brought into class one condition, maintenance could be accomplished by control burning. If sections of the fuelbreak on public lands are burned on a five year cycle, annual costs in 1982 dollars have been estimated to be approximately \$6,600. Ongoing maintenance which must also occur on private property will most likely be done by hand, small equipment, goats and/or the use of appropriate chemicals. The Committee recommends that a brush disposal program be developed to provide a nearby site for area homeowners and public agencies to dispose of brush during fuelbreak construction and maintenance. The Board of Directors of the EBRPD has agreed to provide a site and conduct the first year demonstration of an urban-wildland brush disposal site on the condition that a long term funding mechanism be developed to cover ongoing operations costs.

The Committee was especially concerned that fuelbreak construction would in no way damage unique and sensitive natural plant communities which exist within the East Bay urban-wildland interface zone. The report and its recommendations reflects the Committee's recognition of the desirability of minimizing disturbance to relatively fire resistant

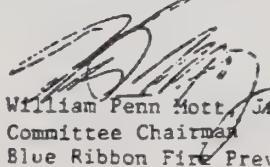
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natural Redwood, Bay and Oak forest and woodland habitats as well as north coastal scrub communities. These vegetation types usually contain high moisture levels making them less of a fire hazard and are of very high wildlife habitat value. Maps contained in the report detail the specific areas along the interface zone which District staff believes are environmentally sensitive and should remain in their natural condition with further study required before any modification for fire reduction purposes is performed. The maps also specify those areas where fuelbreak construction would be appropriate and desirable given the vegetation types present.

Finally, the Committee's report includes a three step plan for implementing their recommendation for minimizing the risk of fire within the urban-wildland interface zone. The first step calls for distribution of the final report to the governing bodies of all affected public agencies; the cities of Berkeley, El Cerrito, Oakland, Richmond, Contra Costa County, the East Bay Municipal Utility District and the East Bay Regional Park District. Representatives from the Committee will make presentations to the governing boards of these key agencies to seek formal support for the implementation of the plan. Secondly, the Committee recommends that public hearings be conducted by individual public agencies throughout the interface zone as necessary to conform with CEQA guidelines and to inform area residents of the various elements of the plan and to gain their support and cooperation. Thirdly, the Committee has recommended that a Joint Powers Agency representing the cities of Berkeley, El Cerrito, Oakland, Richmond, Contra Costa County, the East Bay Municipal Utility District, U.C. Berkeley Campus, and the East Bay Regional Park District be established to develop a final construction and action plan and coordinate efforts to institute a special assessment District encompassing the entire interface zone. The report recommends the use of the Special Assessment District as a funding vehicle to raise the funds necessary for the construction and maintenance of the fuelbreak, as well as for funding fire protection, projects and fire code inspection of the interface zone. The Assessment District could also be used to fund coordinated firefighting efforts within the interface zone and to operate brush disposal sites in the area. The Committee has endorsed the use of a Special Assessment District to fund special fire protection measures within the interface zone because agency representatives felt that the required local funds were not forthcoming in current city budgets and that homeowners who choose to live in high risk fire areas should share in paying for improved fire prevention measures.

The work of the Blue Ribbon Committee in preparing this report and recommendations is the first step in what must be a cooperative effort involving public agencies and homeowners to minimize the fire danger within the East Bay hill area urban-wildland interface zone. Implementation of the Committee's recommendations must now be addressed by each of the public agencies operating within the interface zone. East Bay Regional Park District staff and members of the Committee will be working together to insure the necessary follow through for achievement of the report's long term goals.



William Penn Mott, Jr.
Committee Chairman
Blue Ribbon Fire Prevention Committee

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